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Epidemiology of Inhalant Abuse: An International Perspective

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Introduction

Zili Sloboda, Nicholas Kozel, and Mario R. De La Rosa

The abuse of the class of substances that include volatile solvents and inhalants is an endemic problem worldwide. The abuse of such substances, however, is not a new or novel behavior, but one that has been observed by epidemiologists for decades throughout the full array of cultural settings. There is no doubt that these substances have the potential to cause major physiological and neurological damage that, in many cases, cannot be remedied. The severe organic damage associated with inhalant abuse has been documented extensively, but the difficulties in controlling abuse through environmental regulations and mechanical means have perplexed public health officials.

These issues of regulation as well as the epidemiology and consequences of inhalant abuse as an international problem are addressed in this volume. Research directions on inhalant abuse in the early 1990s have begun to focus on exploring the psychosocial and cultural factors responsible for the use of inhalants and the physical consequences associated with the use of different classes of volatile solvents. Despite these research efforts, information on the epidemiology and etiology of inhalant abuse in the United States and other countries is limited. The lack of systematic information on the extent and nature of inhalant use and abuse limits the development of effective, culturally relevant prevention and treatment programs to address this problem in the United States and other countries of the world.

The chapters presented in this monograph are the result of a technical review meeting titled “Inhalant Abuse: An International Perspective,” sponsored by the Division of Epidemiology and Prevention Research, National Institute on Drug Abuse (NIDA), and the United States Information Agency. The major objective of this meeting was to review the state of knowledge about the nature and extent of the problem in countries that represent various regions of the world, as well as to describe the characteristics of those involved and, where data permit, discuss the etiology of the behavior. Prior prevention efforts in the United States to address inhalant abuse were reviewed, and recommendations were made for future prevention programming. In addition, issues relative to the treatment of inhalant abuse were raised and discussed, as were recommendations for future research on the nature and

extent of inhalant abuse in the United States and other countries in the world. The chapters in this volume describe the nature of inhalant abuse in countries representing the regions of the world: North America, Asia, Europe, Latin America, and Africa. The final section of the book presents chapters that address the prevention of inhalant abuse, methodological issues related to the conduct of epidemiologic research on inhalants, and policy issues concerning inhalant abuse.

The most extensive data regarding the abuse of inhalants that are available are those for the United States. However, despite the ready availability of descriptive information on the extent of inhalant abuse, the nature of the many substances involved and the characteristics of the abusing population increase the difficulties of such assessments. Drs. Ruth W. Edwards and E.R. Oetting in their chapter, "Inhalant Use in the United States," lay out the issues related to the collection of epidemiologic information on inhalant abuse. The definitional issue is addressed, and the authors suggest several approaches that can be used in data collection instruments. They state, "There does not appear to be a simple solution to the problem of definition of inhalants, but various conventions have emerged in the field and in the literature." These "conventions" are discussed and put into the frame of the survey questionnaire. Comparisons are made among various question formats, and the authors demonstrate how such formats will elicit differing forms of response that may have divergent degrees of reliability and, of particular concern, validity.

This introduction sets the stage for a presentation of the findings regarding inhalant abuse from several national and local area studies in the United States and from around the world. These studies are presented to show the differing patterns of inhalant abuse across demographic groups including age, gender, ethnicity, geographic area (rural versus urban), and school status (dropouts). Finally, it is pointed out that for some populations, inhalants are gateway drugs leading to the initiation of illicit drugs.

Drs. Foong Kin and Vis Navaratnam provide an overview of inhalant abuse in countries of Asia and the Pacific region, including Australia, Brunei Darussalam, Hong Kong, Malaysia, New Zealand, the Philippines, the Republic of Korea, Singapore, and Thailand. As noted in the chapter, data on the overall incidence, prevalence, correlates, and consequences of inhalant abuse in the Asian region are limited and vary widely between countries. Some countries, such as the Philippines, have

a comparatively lengthy history of inhalant abuse, while abuse in most of the other countries became problematic only in the 1980s. As the authors point out, the paucity of information about inhalant abuse in this region makes conclusions regarding the nature and scope of the problem tenuous. However, the predominant characteristics of inhalant abusers in Asia and the Pacific (i.e., minority populations and youth) and the prevalence and the low cost of a wide variety of available substances are a cause of serious public health concern for each of the countries reviewed.

Laura Edith Baldivieso's chapter focuses on the problem of inhalant use and abuse in Bolivia. Data collected from a number of local surveys and ethnographic studies indicate that inhalant use is a serious problem among street youths. The findings from these studies also suggest that street children who use inhalants are more likely to be abused by their families and to be forced to earn a living than children living at home who do not use inhalants. The author also reports that efforts to prevent and treat the use of inhalants, especially among high-risk children, are limited at present. Prevention and treatment efforts against the use of inhalants at this point are being addressed almost exclusively by private institutions.

As Dr. Beatriz Carlini-Cotrim states in the first sentence of her chapter, "Inhalant Use Among Brazilian Youths," inhalant abuse is "an old phenomenon" in Brazil. Indeed, inhalant abuse has been recognized as a problem in Brazil since the 1920s. Dr. Carlini-Cotrim presents all available epidemiologic data on inhalant abuse among students in Brazil. She points out that over 40 percent of the population of Brazil consists of young people under the age of 18. Given that the major drug abuse problem for young people is the use of inhalants, this behavior presents a particular challenge for Brazil. In some geographic areas, inhalant abuse among youths with other problems is concentrated in poverty areas. In times of economic hardship, these children end up on the streets and become involved in the use of alcohol and in petty crime. Many of these children have been rejected by their families and join together in groups that are threatening to local businesses. The actual number of children on the streets is difficult to assess, although the estimates of true "throw-away" children (i.e., children without families) show a few thousand. Studies of these children in São Paulo and Porto Alegre show that use of drugs vary among subgroups of street children. Such variation may be the result of varying levels of involvement with families and other social

agencies. Dr. Carlini-Cotrim concludes with a discussion of prevention issues and areas for further epidemiologic research.

Drs. Luis Duque and Edgar Rodríguez and Jaime Huertas describe the problem of inhalant use in Colombia. The results of their analysis identify inhalants as the fourth most prevalent group of substances of abuse among Colombians, after alcohol, tobacco, and marijuana. The authors also found that single individuals, persons living in urban areas, and individuals between the ages of 12-17 were at highest risk of participating in inhalant abuse. The authors also discuss inhalant use among pregnant women and the efforts made by the Colombian Government and private institutions to address this particular part of the problem. They conclude with a commentary on the lack of prevention and treatment programs to address the inhalant abuse problem in Colombia and suggest that more research on this issue is needed, given the changing and growing nature of the inhalant use problem in Colombia.

The need for establishing a sound epidemiologic research foundation for the development of prevention and treatment services for inhalant abuse is discussed in Dr. Eva Katona's chapter, "Inhalant Abuse: A Hungarian Review." In this chapter, Dr. Katona describes an epidemiologic picture of drug abuse in Hungary and the status of epidemiologic research in this country which is undergoing great political, social, and economic change. She presents a description of inhalant abuse and how patterns of such abuse vary across the country. She suggests that local variability requires varying responses. Her review of the research in Hungary also points out the lability of inhalant abuse, with trends indicating epidemic periods as well as periods of minimal or almost no use. Dr. Katona states at one point in her chapter, "More research is needed on the circumstances and conditions that put one population more at risk than another or what cultural norms and values are related to drug abuse." Dr. Katona's statement reflects a universal need in the field, whether one is addressing the problem locally or globally. In conclusion, Dr. Katona cogently puts the Hungarian drug abuse problem into the context of the changes going on within Hungary, as well as those changes occurring in such surrounding countries as the former Yugoslavia: The opening to the West and of borders, in conjunction with unstable economic and social conditions, all serve to impact substance abuse in general, and in the face of economic hardship, inhalant abuse specifically.

Dr. Hiroshi Suwaki reviews trends of solvent abuse in Japan during the past several decades. Using primarily treatment, education, and law enforcement data, Dr. Suwaki documents the increasing trend in abuse of organic solvents, which he states has been at a continuously high level since the 1970s and which confronts every prefecture in Japan. Dr. Suwaki concludes by characterizing a treatment population of youth and presenting a topography of solvent abuse among a psychiatric population.

The chapter by Maria Elena Medina-Mora and Shoshana Berenzon provides a comprehensive overview of the inhalant use problem in Mexico and efforts undertaken by the Mexican Government and institutions in the private sector to address this problem. According to the authors, inhalants comprise the third most prevalent drug group of abuse in the Mexican population, after tobacco and alcohol. Data from several school-based and national household surveys suggest that the use of inhalants among Mexicans occurs at an earlier age than that observed for other substances. Males also were found to use inhalants at a higher rate than females. In addition, students who reported the use of solvents were more likely to be arrested than users of other drugs. In their conclusion, the authors describe ways in which Government officials in Mexico are beginning to develop prevention and treatment programs to address the problem of inhalant use and abuse.

Inhalant abuse is an emergent problem in Nigeria, as reported by Dr. Isidore Silas Obot. Dr. Obot presents the findings of several studies that show the prevalence of substance abuse (he compares alcohol, cannabis, and solvents) has varied between major Nigerian cities, with rates of solvent abuse highest in Lagos, a major commercial city. He also found that rates of inhalant abuse were higher for northern areas of Nigeria than for other areas. Dr. Obot concludes that the geographic differences in prevalence rates may be due to cultural, principally religious, differences; he suggests that more research is needed to explore this hypothesis. In conclusion, Dr. Obot addresses the special issues associated with the prevention and treatment of inhalant and other drug abuse. The lack of adequately trained personnel, facilities and other resources, and the labeling of drug abuse as a mental health problem all serve to make public health intervention difficult.

Dr. Roberto Lemer and Delicia Ferrando review the problem of inhalant use in Peru. According to the authors, the prevalence and consequences of inhalant use appear to be low in the general population but high among marginalized children. Use of inhalants ranks third in lifetime

prevalence, after alcohol and tobacco use. Among marginalized children, inhalant use and abuse is high, with the majority of these children reporting that they use inhalants on a daily basis. The authors also discuss the lack of prevention and treatment programs and the lack of research on this topic, which provides a serious impediment to the development of a national strategy to address this problem.

John Ramsey, Jennifer Taylor, and Drs. H. Ross Anderson and Robert J. Flanagan provide a comprehensive description of the volatile substance abuse problem in the United Kingdom. A sharp increase in the number of deaths (predominantly of male adolescents) attributable to volatile compounds began in the 1980s and that level of mortality has been maintained into the 1990s. The authors present a detailed description of the methods of data collection and limited access to current information. They describe specific volatile substances abused and the characteristics of abusers in the United Kingdom. They conclude with a commentary on attempts to address the volatile substance abuse problem in the United Kingdom through legislation, treatment and prevention, and the response of industry to issues involving product change.

Dr. Pamela Jumper-Thurman, Barbara Plested, and Dr. Fred Beauvais address the issue of treatment strategies for volatile substance abusers in their chapter. As the authors point out, the drug abuse treatment field has been challenged by inhalant abuse. It has been believed that the resultant neurological and physiological damage from the use of inhalants was not only irreversible, but it also made treatment almost impossible. These complications as well as the characteristics of the inhalant abusers that have implications for treatment are discussed. Family problems, academic failure, and other social problems require multiple services and counseling approaches in the treatment setting. This chapter sets forth principles for treating inhalant abusers that have promise for effective interventions. Issues such as treatment readiness; use of peer-patient advocacy; thorough physical, cognitive, and neurological functioning; and knowing the patient individually as well in the social and cultural context serve to increase chances of success. This chapter should stimulate treatment practitioners not only in the United States but in other countries in which inhalant abuse is recognized as a problem.

Dr. Blanche Frank reviews research data on inhalant use and abuse from a methodological perspective. Based principally on studies conducted in New York State, Dr. Frank describes the three general methodological approaches used to estimate incidence and prevalence, monitor patterns

and trends, and characterize vulnerable populations. These three methods are direct population surveys, indirect indicators based on social and health consequences, and ethnographic studies of targeted populations or issues. Dr. Frank concludes with a discussion of limitations associated with current research on inhalant use and abuse and suggests ways to improve the quality of the data collected.

Invited presentations are concluded with a chapter by Henrick Harwood. In this chapter, the author discusses policy issues surrounding inhalants in the United States. He describes the background of the inhalant problem and the current status of State and Federal laws and regulations that have been implemented in an attempt to restrict abuse of inhalants. In so doing, he unveils the complexity of underlying attempts to control a category of substances with such widespread household and industrial applications as gasoline, paint, and glue. In addition to Federal and State Government activities, initiatives taken by business and educational institutions to prevent abuse of inhalants are described. The author concludes with policy options that could effect change and areas of research need that are vital for understanding the inhalant abuse problem and for implementation of effective preventive intervention programs.

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Inhalant Use in the United States

Ruth W. Edwards and E.R. Oetting

DEFINING INHALANTS

Establishing base rates for inhalant use has proven to be a more difficult task than it has been for most other drugs. Although attempts have been made to clarify the definition of inhalants, there is no completely logical answer to the problem that always will hold up over different populations and across time.

Part of the problem lies in the nature of what we refer to as "inhalants." Most drugs can be identified by the psychoactive substance involved. For instance, hashish, sinsemilla, and "hash oil" are all forms of marijuana, and "grass," "pot," and "reefers" simply are different names for marijuana; their use can be classified under the category of marijuana use. Inhalants, however, generally are defined by the route of administration of a substance, either taking the drug directly to the lungs through sniffing (through the nose) or by huffing (through the mouth). Using this definition, inhalants can include a broad range of chemical substances that may have widely varying pharmacological and psychoactive effects. While this "route of administration" definition at least is partially descriptive, it clearly is flawed. For example, cocaine and heroin can be sniffed and, when burned, tobacco and crack can be inhaled. These drugs, however, would not be classified as inhalants.

Another approach limiting the definition to volatile substances was used in the July 1989 issue of *Human Toxicology,* which was devoted entirely to use of inhalants. This definition presents difficulties, however, since it limits inhalants to the vapors derived from materials that are solid or liquid under ordinary conditions. For the most frequently inhaled substances—glue, gasoline, and paint—this definition works well, and nearly all inhalant users do use some of these materials. Other gases, however, also are used by inhalant users. Spray-can propellants are frequently used and, in recent years, sniffing of butane gas, which is commonly available in cigarette lighters, has become more prevalent.

There does not appear to be a simple solution to the problem of defining inhalants, but various conventions have emerged in the field and in the literature. Substances that must be burned or heated, such as tobacco and

crack, are not included. The amyl and butyl nitrites (e.g., "poppers" and "rush") usually are classified separately from other inhaled substances, since they generally are used as sexual stimulants by some groups who do not use other inhalants. Chronic use of an anesthetic gas, such as ether or nitrous oxide, without use of other volatiles probably should be diagnosed as a specific drug intoxication or dependence instead of being classified as inhalant use, since users of these drugs often do not have the social and emotional adjustment problems typical of most inhalant users (Beauvais and Oetting 1987).

These rather arbitrary rules work reasonably well for defining the kinds of substances used most often by the people generally classified as inhalant users, but no perfectly logical definition of inhalants really is possible. It is essential that those studying or writing about inhalant use or diagnosing inhalant intoxication or dependence make clear the conventions they are using to define inhalants.

SURVEY QUESTIONS TO ASSESS INHALANT USE

The problems in defining inhalant use noted above create serious difficulties for researchers formulating survey questions to assess involvement with inhalants. Various studies, for instance, may obtain disparate results and reach dissimilar conclusions because incompatible definitions or conventions regarding inhalants have been used.

As an example, the conclusions reached about trends in inhalant use among U.S. high school seniors are radically different depending on whether nitrites are included in the definition of inhalants. Figure 1 illustrates this point using data from the Monitoring the Future study (also known as the National Senior Survey) (Johnston et al. 1992*a*), showing trends in use of nitrites, inhalants other than nitrites, and inhalants including nitrites. This figure shows how radically different the conclusions about trends in inhalant use can be depending on whether nitrites are included in or excluded from the definition of inhalants. The top curve in figure 1 shows that if nitrites are included as inhalants—which some researchers would endorse—these data would indicate that lifetime prevalence of inhalant use has been *stable* since the survey was first given in 1979. However, when nitrites and other inhalants are considered separately, the conclusion is very different. During the last decade, exposure of high school seniors to nitrites has dropped steadily, while use of inhalants other than nitrites has increased

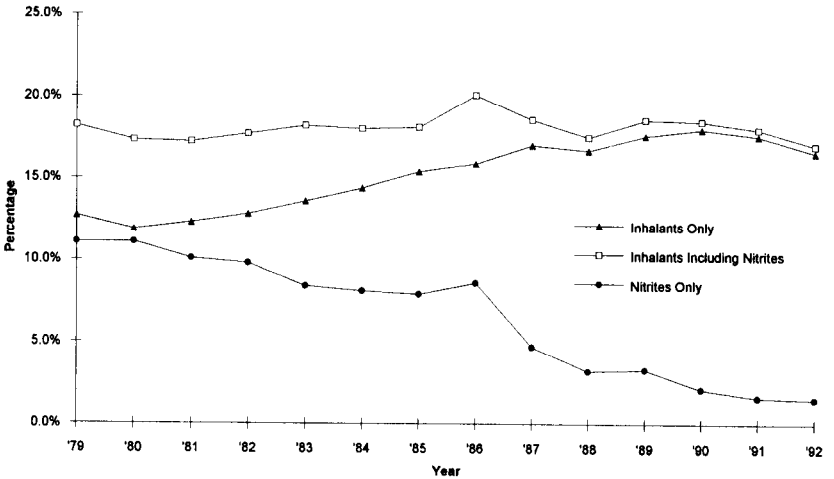

FIGURE 1. *Lifetime prevalence for 12th graders of inhalant use including nitrites, inhalants only, and nitrites only.*

SOURCE: Monitoring the Future study (Johnston et al. 1992*b*)**.** Figure adapted from Beauvais (1992*b*).

just as steadily, stabilizing during the period from 1987 to 1989. This very important trend can be obscured depending on the convention used for defining inhalants.

Results obtained from survey inhalant questions also are highly sensitive to the wording and phrasing of the question. For most other drugs, as long as the question is clearly put and the response alternatives are simple and direct, rates of use reported do not seem to be highly dependent on the form of the question. For example, most surveys that are given in the same time period to similar populations show almost identical rates of use for marijuana, cocaine, and most other drugs, even when the phrasing of the questions differs somewhat from survey to survey. This is not true, however, for inhalants. As an example, the Monitoring the Future study (Johnston et al. 1992*b***)** uses the following question:

On how many occasions (if any) have you sniffed glue, or breathed the contents of aerosol spray cans, or inhaled any other gases or sprays to get high . . .

	0	1-2	3-5	6-9	10-19	20-39	40+
...in your lifetime	○	○	○	○	○	○	○

The American Drug and Alcohol Survey™ (Oetting et al. 1985) uses a similar but somewhat different question:

Have you ever "sniffed" (or "huffed") glue, gas, sprays, or anything like that to get high? (Do NOT include cocaine.)

○	○
Yes	No

The contents of these questions appear to be quite similar and, as such, they logically should lead to essentially the same results. Every year since 1988, however, more than 17 percent of seniors indicate that they have tried inhalants on the first question, while only approximately 11 percent of seniors respond yes to the second question. Following is a brief discussion and evaluation of why this difference might occur.

Form of Response

The Monitoring the Future study asks for a response of "On how many occasions . . ." versus the "yes/no" format used by The American Drug and Alcohol Survey™. It might be construed that the Monitoring the Future response is somewhat more detailed and might encourage admission of a single use of inhalants over the blanket "yes" of The American Drug and Alcohol Survey™. Another explanation might be that the differences are due to different samples used to obtain these estimates. Neither of these explanations hold up, however, when responses to the two survey formats are compared for other drugs. Both surveys use these same formats for their questions asking about marijuana use and get essentially the same rates of use despite the differences in samples and in the form of the answer.

Exclusion of Cocaine

One further difference between the questions on the two surveys is that The American Drug and Alcohol Survey™ question specifically says, "Do NOT include cocaine," but it seems unlikely that 6 percent of the respondents to the Monitoring the Future study would include cocaine when asked about their use of "gases or sprays."

Reliability of the Questions

Still another possibility is that one of these questions is unreliable. This explanation essentially can be discounted, however, because year after year both the Monitoring the Future study and The American Drug and Alcohol Survey™ obtain rates from successive samples of seniors that are within a percentage point or two of the previous year's results. It is unlikely this consistency would exist if either question were unreliable.

When survey results are so dependent on the form of the question, it is hard to determine exact rates of use. One solution might be to average results from different formats of the questions; another might be to use the highest rate since that indicates the possible maximum level of exposure. Further studies are required to determine exactly why young people are apparently interpreting these very similar questions differently.

The magnitude of reported inhalant use prevalence, however, is such that choosing a particular number for the rate of inhalant use may not be of critical importance. Although the differences between surveys are not small ones, if either rate were chosen as the "true" figure, it would lead to essentially the same conclusions in terms of policy, prevention, or treatment planning. Whether the "true" rate is 11 percent or 17 percent, there is entirely too much experimentation by youth with inhalants, and effective prevention efforts are needed to reduce this exposure.

Another illustration of how even a simple change to a question may alter results significantly comes from the Monitoring the Future study's question on nitrites. Until 1986, the question asked was, "On how many occasions (if any) have you used amyl or butyl nitrites (poppers, snappers, Locker Room, Vaporole, Rush, Kick, Bullet)?" After 1987, the list of examples was removed. Figure 1 shows that, although generally there has been a relatively steady decline in nitrite use, there is a considerably larger drop in the rate of use between 1986 and 1987. Some of that change probably is due to the change in the question.

Clearly, it is very important to be aware that responses to inhalant questions are likely to vary if the questions are even slightly different. While prevalence rates obtained from different survey questions might be compared for drugs such as marijuana, this is not true for inhalants. This has particular importance in comparing rates from different populations, where erroneous conclusions might lead to inappropriate policy decisions. It also is indicative of the importance of maintaining the same

wording for a survey question throughout evaluation of prevention programming. Further, this sensitivity to changes in inhalant questions means that cross-cultural and cross-language comparisons may be inappropriate since even modest disparities in prevalence rates may be due to differences in interpretation of the question rather than real differences in drug use. There is great need for methodological cross-cultural studies to clarify these issues.

At the same time, however, there is some reassurance that we can measure prevalence of inhalant use using survey questions. As long as the identical survey question is used, questions about inhalant use are reliable and lead to consistent results. Trends over time can be charted accurately as long as the question is not altered, even slightly. When language differences exist, inhalant questions can be translated carefully, and the results probably will be stable across time *for that translated question,* but results from the original question and the translated question should be compared only with caution. Finally, evaluation of the effects of prevention programs is possible as long as the same question about inhalant use is used for pre-post testing; any change in the question, however, should be expected to lead to invalid results.

TRENDS IN INHALANT USE IN THE UNITED STATES

Use of Inhalants by Adolescents

Figure 1 shows the Monitoring the Future study trends in lifetime prevalence of inhalant use for high school seniors (Johnston et al. 1992*b*). For the past 19 years, the Monitoring the Future study (sponsored by the National Institute on Drug Abuse [NIDA]) has obtained a geographically random sample of high school seniors each year. Not counting nitrites, there was a steady increase of about 0.5 percent a year from about 1980 until 1987. Since then there has been some variation from year to year to the current level of approximately 17 percent—this means that about one out of six seniors has tried inhalants at some time. However, while many seniors have tried inhalants, only a few currently are using inhalants (2.5 percent used inhalants during the 30 days prior to taking the survey). Most of the seniors who have tried inhalants used them when they were younger.

A similar result is found from The American Drug and Alcohol Survey™. Tables 1 and 2 show lifetime prevalence rates and current use for inhalant

use beginning in 1987 when the survey was first used to assess drug use of large numbers of youth across the country. According to this survey, between one in eight and one in nine seniors have tried inhalants, but only 2 percent have used them in the last month. As noted above, because the questions are slightly different, the rates of use for seniors are slightly lower than those from the Monitoring the Future study, but essentially the same trends appear for recent years. Both surveys indicate that, since 1987, rates of inhalant use have changed very little.

Use of Inhalants by Young Children

Tables 1 and 2 also provide data on use of inhalants by children in every grade from 4th through 12th. They show that there is a significant segment of very young children who try inhalants and who have used inhalants in the last month, suggesting that they are continuing to use them, not just trying them. By the fourth grade, about 6 percent of U.S. children have tried inhalants. As they get older, a few more young children try inhalants with each passing year, so lifetime prevalence increases steadily with each year until it peaks at about 16 percent in the eighth grade. While marijuana is considered by most to be the so-called gateway drug leading to use of other illicit drugs, more than half of the very young children who try inhalants have not even tried marijuana. In 1988, more eighth graders reported having tried inhalants than having tried marijuana, and this difference has increased over the past 5 years (Edwards 1993). Now the first illicit drug used by children is more likely to be an inhalant than it is to be marijuana.

Table 2 shows that from one-third to one-half of the young children who are experimenting with inhalants are not just trying the drug once. They are using inhalants once a month or more. Much of this early inhalant use is mere experimentation but it is dangerous in itself, and using any drug increases the tolerance for drug use, creating danger of further drug involvement. There also are children who go beyond experimentation and get heavily involved with inhalants. The most serious form of obsession with inhalant use probably occurs in countries other than the United States where young children live on the streets completely without family ties. These groups almost always use inhalants at very high levels (Leal et al. 1978). While the United States does not have a significant population of young, inhalant-abusing “street kids” such as those found in some other countries, there are children in the United States who are

TABLE 1. *Lifetime prevalence of inhalant use among U.S. students (values in percentages).*

	1987	1988	1989	1990	1991	1992	Total N
4th	**5**	**6**	**5**	**6**	**7**	**6**	**22,907**
5th	7	7	7	7	7	6	38,595
6th	12	8	7	9	9	7	25,542
7th	12	13	10	11	14	11	74,604
8th	**15**	**16**	**14**	**15**	**16**	**16**	**153,491**
9th	14	15	14	14	15	16	84,545
10th	16	14	13	13	15	15	95,180
11th	11	13	11	12	13	13	69,035
12th	**11**	**11**	**10**	**11**	**12**	**13**	**133,056**
Total N	45,174	113,690	124,994	142,753	198,936	71,408	696,955

SOURCE: The American Drug and Alcohol Survey™.

obsessed with inhalant use. They sneak away with their friends to use inhalants at every opportunity. These peer clusters are more likely to occur in environments where inhalant use generally is high, but they can appear anywhere.

Tables 1 and 2 show that trends over time essentially are flat for every grade from the 4th through the 12th. Again, there has been little or no change in inhalant use since 1987. While the use of many other drugs seems to be declining, use of inhalants essentially has not changed.

Prevalence Rates Higher for 8th than for 12th Grade

Table 1 shows that lifetime prevalence of inhalant use peaks around the 8th grade and then drops off up through the 12th grade. This finding apparently is illogical. Items on lifetime prevalence enquires, “Have you ever tried this drug?” Once someone has tried a drug, they thereafter always should indicate that they have used that drug. Since new people

TABLE 2. *Current use of inhalants by U.S. students (values in percentages).*

	1987	1988	1989	1990	1991	1992	Total N
4th	**2**	**4**	**3**	**3**	**4**	**3**	**22,907**
5th	3	3	3	4	4	3	38,595
6th	5	4	4	4	4	4	25,542
7th	3	5	3	4	15	3	74,604
8th	**5**	**5**	**5**	**5**	**5**	**6**	**153,491**
9th	4	4	4	4	5	5	84,545
10th	3	3	3	3	4	4	95,180
11th	2	2	2	2	3	2	69,035
12th	**2**	**2**	**2**	**2**	**2**	**2**	**133,056**
Total N	45,174	113,690	124,994	142,753	198,936	71,408	696,955

SOURCE: The American Drug and Alcohol Survey™.

might try a drug every year and, since anyone who has used it before should continue to indicate that they have tried the drug, lifetime prevalence always should increase with every year that passes; it should never decrease. For most drugs, in fact, lifetime prevalence does either increase across grades or remain relatively steady after the ninth grade (Oetting and Beauvais 1990). An examination of table 1, however, shows that lifetime prevalence for inhalant use invariably is lower in the 12th grade than it is in the 8th grade.

In any one year, these are different age cohorts so the above result could occur if inhalant use were increasing among younger students and the increase had not yet reached the 12th grade. Comparing the same age cohorts across time (1987 8th graders with 1991 12th graders), however, yields the same result. The 12th graders show lower lifetime prevalence.

This paradoxical result is not unique to this study; it appears in almost every survey where lifetime prevalence of inhalant use is assessed for 8th and 12th graders. The best explanation probably is that many 8th grade inhalant users drop out of school before they reach the 12th grade. By the time their age group reaches the 12th grade, many of the early

inhalant users are gone, so lifetime prevalence for 12th graders is lower than that for 8th graders.

Use of Inhalants by Adults

Data on inhalant use by adults is available in the United States from the National Household Survey on Drug Abuse sponsored by the Substance Abuse and Mental Health Services Administration (SAMHSA). The questions asking about inhalant use on the National Household Survey do use a slightly different wording and definition of inhalants, so it is not appropriate to compare rates from this survey with the adolescent rates from either the Monitoring the Future study or The American Drug and Alcohol Survey™. Unfortunately, in reporting data on adolescents from the National Household Survey, ages 12-17 are aggregated, thus obscuring important changes in inhalant use that occur over this age range. The aggregated data, however, can be used to compare with adult rates reported on this same survey. These data are presented in table 3 (Substance Abuse and Mental Health Services Administration, unpublished data).

Since the National Household Survey is not a school-based survey like the Monitoring the Future study or The American Drug and Alcohol Survey™, it can be assumed that this survey includes dropouts. In previous research, it has been reported that dropouts generally have higher rates of use for all drugs, including inhalants, than their in-school counterparts (Chavez et al. 1989). Contrary to what might be expected from the trends for school-based surveys observed in table 1, the data from the National Household Survey do not show a decrease in either lifetime prevalence or current use from the 12-17 age group to the 18-24 age group. Inclusion of dropouts in the National Household Survey may contribute to this finding. Another possibility, however, was raised in the recent General Accounting Office (1993, p. 37) report on drug use measurement. In that report it is noted that, at the time of data collection for the 1990 survey, someone else in addition to the interviewer and interviewee was in the room for at least one-third of the time of the interview for almost one-third of the Hispanics in the 12-17 age group and for approximately one-fourth of the non-Hispanic black subjects in this age group. This factor could contribute to underreporting of inhalant and other substance use by this 12-17 age group.

TABLE 3. *Use of inhalants by U.S. adults (values in percentages).*

Age group	Lifetime prevalence	Current use
12-17 years	5.7	1.6
18-25 years	9.8	.8
26-34 years	9.2	.4

SOURCE: Preliminary data from the 1992 National Household Survey on Drug Abuse, SAMHSA, June 1993.

Table 3 shows that there is very little current use of inhalants among adults. This figure, however, may slightly underrepresent the prevalence of inhalant use since inhalant use into adulthood can be very debilitating, and chronic users may have suffered such impairment that they were not included in the survey because they were no longer members of households.

INHALANT USE AMONG DIFFERENT SUBPOPULATIONS

Gender and Inhalant Use

There has been a consistent and significant gender difference in inhalant use among high school seniors in the Monitoring the Future study (Johnston et al. 1992*b*)**.** In 1990, about 21 percent of male seniors and only 14 percent of female seniors reported they had tried inhalants. Although very few seniors reported use of inhalants in the 30 days prior to the survey, there also are gender differences in these results, with about 3.5 percent of male seniors and only about 2 percent of female seniors having used inhalants in the last year. Results for seniors from The American Drug and Alcohol Survey™ show, as noted above, lower overall rates of lifetime prevalence, but the gender differences essentially are the same as those found by Johnston and his colleagues (1992*b*) (see table 4). Table 4 also shows that, for sixth graders, boys use inhalants

somewhat more than girls, but the difference decreases across the seventh through ninth grades. However, starting in about the 10th grade, the gender differences in inhalant use rates increase until, by the 12th grade, over twice as many males as females are using inhalants.

Ethnicity and Inhalant Use

Inhalants may be hard to define precisely, but it is even more difficult to define ethnic groups. Trimble (1992) has discussed this problem, pointing out that much of the research on ethnicity relies" . . . on the use of broad ethnic glosses, superficial, almost vacuous, categories that serve only to separate one group from another. Use of such glosses gives little or no sense of the richness of cultural variations within these groups, much less the existence of numerous subgroups characterized by distinct lifeways and thoughtways" (p. 105). Despite these problems in defining ethnicity, it sometimes is necessary for policy and planning purposes to define large groups that share some background characteristics. The ethnic breakdowns for data reported in this chapter utilize standard census classifications and are based on self-identification by the survey respondent.

There has been a general belief among drug researchers that Hispanic youth including Mexican Americans, Spanish Americans, Cubanos, Puerto Ricans, and groups with Central or South American backgrounds tend to be more susceptible to inhalant use. There also has been a belief that African-American youth (those self-identified as "black" or "African American") do not use inhalants. The former belief was based, in part, on early studies by Padilla and colleagues (1977, 1979), who found exceptionally high rates of inhalant use among Hispanic West Coast youth who lived in barrios. Other studies (Beauvais 1992*b*) partly confirm the belief about African-American youth, noting that, in 1987, African-American youth showed the lowest rates of inhalant use, about half that found for other youth.

Neither of these beliefs, however, holds up consistently. Data from the Monitoring the Future study (Johnston et al. 1992*b***)** show that Hispanic seniors essentially have the same rates of use as other U.S. high school seniors and, while fewer African Americans use inhalants, the number is not negligible. They found that among African Americans about 11 percent of eighth graders and 7 percent of high school seniors indicate that they have used inhalants.

TABLE 4. *Inhalant use by gender and grade (values in percentages).*

	Lifetime prevalence		Current use	
	Males	Females	Males	Females
6th grade (n = 14,249)	10.4	7.5	4.0	2.6
7th grade (n = 22,699)	13.6	11.6	4.7	4.4
8th grade (n = 36,220)	17.1	16.2	6.2	6.4
9th grade (n = 20,283)	16.4	15.9	5.0	4.9
10th grade (n = 22,948)	15.7	13.2	4.3	3.5
11 th grade (n = 16,710)	15.3	10.8	3.3	2.1
12th grade (n = 22,592)	15.1	8.6	2.7	1.2

SOURCE: The American Drug and Alcohol Survey™ (1992-93 data base).

Padilla's high rates among barrio Hispanics almost undoubtedly are related to the poverty, lack of opportunity, and social dysfunction that occur in barrios, not to the fact that these youth happen to be Hispanic. The same general tendency appears for Native-American youth. Indian reservations are among the most disadvantaged environments in the United States; there are high rates of unemployment, little opportunity, and high rates of alcoholism and other health problems. Native-American youth who live on reservations show very high rates of inhalant involvement (34 percent of 8th graders and 20 percent of 12th graders have tried inhalants), while Native Americans who live in nonreservation communities show high rates of inhalant use but not nearly the level of use found in reservation youth (Beauvais 1992*a*). It is

likely that inhalant use is associated with poverty, prejudice, and lack of opportunity, no matter what ethnic group is involved.

Although The American Drug and Alcohol Survey™ has been given to large numbers of students every year, the number of students surveyed in each of several minority groups in any given year is small. In order to get enough data on individual ethnic groups to make results stable, data have been combined over the 4-year period of 1988-1992 for presentation in table 5. As noted above and illustrated in figure 1, prevalence rates for inhalant use have been fairly stable over this period. The rates reported in table 5, therefore, should represent current rates of inhalant use reasonably accurately.

Rural versus Urban Differences in Inhalant Use

The Monitoring the Future study (Johnston et al. 1992*b*) provides data on rates of inhalant use in different-sized cities. Table 6 shows the results for high school seniors by city size in 1991. These data suggest that seniors in smaller towns might have slightly higher rates of inhalant use than seniors in the largest cities, but the differences are not large.

Peters and colleagues (1992) provide information that specifically looks at rural communities. They compared small towns with populations under 2,500 and larger rural communities with populations of 2,500-10,000 with nonrural communities with populations up to about 400,000. The rural communities all were at least 30 miles from an urban center so as not to include suburban or big city, "bedroom" communities. The results of this comparison appear in table 7. The differences in inhalant use across these community sizes were not significant.

About 20 to 30 years ago, drug use in rural communities probably was considerably lower than in urban areas, but those differences have declined in the past decade. There is some evidence that use of new drugs may start up in the largest cities, often on the East or West Coast, and spread from there—first to the larger inland cities, then to smaller communities. This spread has become so rapid, however, that by 1980 essentially every drug was available in even the most rural towns, and rural drug use in general was almost as high as that in the larger cities. Peters and colleagues (1992) stress that there is a great deal of variability among rural communities but, when data from similarly sized communities are combined, the average rates of use are much like those of other larger communities.

TABLE 5. *Lifetime prevalence and current use of inhalants by ethnicity (values in percentages).*

	Ever tried		Current use	
	8th grade	12th grade	8th grade	12th grade
African American	11	6	3	2
Native American (nonreservation)	20	15	8	3
Native American (reservation)	34	20	15	2
Asian American	10	7	3	1
Mexican American	22	13	8	3
Puerto Rican	19	16	6	5
Spanish American	23	15	8	2
White American	15	12	5	2
Other	21	15	15	4

SOURCE: The American Drug and Alcohol Survey™ (1988-92 aggregated data).

Local Epidemics

Use of most drugs changes very little from one year to the next or from one age cohort to the next. There are changes in drug use over time and across age cohorts, but differences are small and relatively consistent even within a single school. Inhalant use, however, seems to be more variable than the use

TABLE 6. *Inhalant use of 12th graders by city size, 1991 (values in percentages).*

	Lifetime prevalence	Annual prevalence
Large SMSA*	15.2	5.2
Other SMSA	19.4	7.8
Non-SMSA	16.7	5.8

KEY: * SMSA = Standard Metropolitan Statistical Area.

SOURCE: Johnston et al. (1992*a*).

of other drugs. At any one point in time, in almost every individual school or small community, there will be some younger children who are experimenting with or using inhalants. Occasionally for various reasons, however, inhalant use will spread to a considerably larger group in a particular age cohort in one community. That larger group will use inhalants frequently, constituting a local epidemic. As the group gets older, it is likely to continue havmg problems with drugs and with other behaviors. Usually, however, the epidemic stays within the particular age cohort; it is unlikely to spread to younger or older children.

This type of epidemic shows up more in surveys of rural communities. Such surges in inhalant use do happen everywhere but, in larger towns or in larger school systems, they are not as noticeable when data are averaged. In such cases, survey results tend to average out over the larger numbers of students so that an increase of inhalant use in one or two grades in one or two schools does not have a dramatic effect on the overall rate of inhalant use for the community.

These local epidemics are most apparent in barrios and on Native-American reservations, probably because the higher base rates for inhalant use make a local epidemic even more serious. Padilla's barrio studies (1977, 1979) found extremely high rates of inhalant use in the 1977 study; 2 years later

TABLE 7. *Inhalant use by 12th grade males and females in rural and urban towns (values in percentages).*

	Rural < 2,500	Rural 2,500-10,000	Urban > 10,000
Males	16.0	19.2	14.8
Females	12.1	10.9	10.9
Total group	14.0 (n = 3,194)	15.0 (n = 5,293)	12.9 (n = 5,938)

SOURCE: Peters et al. (1992). Data from The American Drug and Alcohol Survey™.

the rate of inhalant use still was high, but it had dropped considerably. There probably was a local epidemic at the time of his 1977 study.

In order to mount timely prevention and intervention efforts, it is critical that such epidemics be detected early in their course. This means that schools and communities should monitor use of various substances, including inhalants, by surveying their students on a yearly basis. With most drugs, the results from one year to the next are not likely to change greatly unless major prevention efforts are made. That is not true for inhalants. When there is a local epidemic, the best approach known at this time seems to be heavy and continuous adult monitoring of the behavior of the youth in the age cohort that is involved. Programs should increase supervised activities outside of school, reduce unsupervised time, and emphasize reduction of opportunities for children to "sneak away" to use inhalants. Some Native-American tribes also have helped to reduce the problem in their communities by instituting "parent patrols." Parents form patrols that regularly check out the places where children could hide to use inhalants together.

Dropouts and Inhalant Use

While the decline from 8th to 12th grade in lifetime prevalence for inhalant use discussed above suggests that youth who use inhalants when they are

young are likely to drop out before they reach the 12th grade, actual data on inhalant use by dropouts are sparse. Studies currently are underway at the Tri-Ethnic Center for Prevention Research at Colorado State University to look at three groups: Native-American adolescents living on reservations and Mexican-American and non-Hispanic white youth living in three communities in the western part of the United States.

Within each of these population groups, three groups of adolescents have been selected for study: (1) dropouts who have not been in school for at least a month; (2) young people in the same grade who have not dropped out but who have poor grades; and (3) young people randomly selected from the same grades as the dropouts. Students for groups 2 and 3 are chosen randomly, from those who match with a dropout on the basis of gender and ethnicity.

Table 8 shows the percentage of young people in each group who have ever tried inhalants and the percentage who indicate inhalant use during the last month. Inhalant use is high for both dropouts and students who have poor grades for all three ethnic groups. Inhalants are not the only drugs used by young people who are having problems with school; dropouts and students with poor grades are more likely to use many drugs than students in good standing in school. Other data from these studies show that there are statistically significant differences in school status (Chavez et al. 1989).

TABLE 8. *Lifetime prevalence of inhalant use and academic standing by ethnic group (values in percentages).*

	Control	Poor grades	Dropout
Mexican American	17	29	32
Non-Hispanic white	23	33	35
Native American	22	34	37

NOTE: Data collected on NIDA and National Institute on Alcohol Abuse and Alcoholism projects through the Tri-Ethnic Center for Prevention Research, Colorado State University, 1992.

CONCLUSION

Unlike other drugs in the United States, there is no evidence that use of inhalants is declining among young people. In fact, it has overtaken marijuana as the most likely first drug for youth. An accurate understanding of the extent and nature of the problem is hampered by methodological problems. These include the difficulty in defining inhalants precisely and the unusual sensitivity of responses to minor differences in survey questions about inhalant use. Males are more likely than females to use inhalants up through about the 6th grade and again after about the 10th grade. During the seventh to ninth grades, however, there are very small gender differences in inhalant use.

One major factor contributing to inhalant use appears to be exposure to poor socioeconomic conditions within a given community. This factor likely accounts for reported ethnic differences in the rates of inhalant use, rather than any cultural or racial propensity to use inhalants. In addition to socioeconomic distress, increased inhalant use seems to be associated with lack of success in school.

The use of inhalants differs from the use of other drugs in a number of significant ways, with important implications for prevention and treatment programs. As the new gateway drug, it is critical that research and prevention efforts pay special attention to the etiology of inhalant use.

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An Overview of Inhalant Abuse in Selected Countries of Asia and the Pacific Region

Foong Kin and Vis Navaratnam

INTRODUCTION

The inhalation of volatile substances for mind-altering and recreational purposes is a phenomenon of recent origin in most countries in Asia and the Pacific region. This could be explained partially by the ready availability and low cost of other substances of abuse, such as heroin. Australia and the Philippines were among the first countries in the region to report the emergence of problems related to the use of volatile substances. This form of drug abuse has drawn considerable concern in this part of the world over the last decade as more countries have noted the increase in incidence of inhalant use and abuse among their young population. For example, in Thailand and Singapore an epidemic of inhalant abuse was recorded in the 1980s (Association of Southeast Asian Nations 1986; Pemgpam et al. 1992). The increased severity of this problem in these two nations may be associated with the stringent controls on opiates, mainly heroin. Although the extent of the problem of inhalant abuse is minimal within the context of the national drug abuse problem in countries in the region, concerted efforts have been undertaken in most countries to prevent the further spread of this phenomenon.

METHODOLOGY

A literature review was carried out to examine available publications and reports on inhalant use and abuse in the region. Concurrently, an open-ended questionnaire was developed. The questionnaire was sent to regional countries through official agencies, as well as the respective national nongovernmental organizations affiliated with the International Federation of Non-Governmental Organizations Against Substance Abuse (IFNGO).

Epidemiologic data were obtained for nine countries: Australia, Brunei Darussalam, Hong Kong, Malaysia, New Zealand, Philippines, Republic of Korea, Singapore, and Thailand. Most of the other countries in the region have difficulties in describing the situation of inhalant use and abuse because of lack of information. Based on the responses as well as on published literature, a country-by-country summary has been prepared.

The sources of information on inhalant abuse vary between the countries. They include data from justice systems (in the case of Malaysia and Korea), school surveys (Australia and New Zealand), high-risk groups (New Zealand and Australia), observational studies (Australia), clinical settings (Thailand and the Philippines), and reporting systems (Singapore and Hong Kong). Each source provides an indication of a specific type of inhalant abuser. For example, school surveys most likely will include beginners and experimenters, while cases contacted in clinical settings will be the more severe abusers. Comparability was limited due to variations in sources of data. Caution was exercised in attempting to compare observations of different countries. Another limiting factor in conducting a regional analysis is the representativeness of the data collected for each country. Most of the countries' assessments of the problem are based mainly on selected samples and groups that may or may not be generalizable to the total inhalant abuser population in each country.

Another limitation is associated with the variations in method or tools that were used to gather data and the different ways in which questions were constructed. This restricts the cross-cultural comparability of the results. Furthermore, prevalence rates were not available for most countries. In spite of these differences, some common features can be inferred from the available information.

It is very apparent from this regional analysis that there is a need for more systematic epidemiological studies to determine the extent and nature of the problem of inhalant abuse and to establish appropriate and feasible information-gathering mechanisms that can monitor this problem over time.

This chapter presents an overview of the extent and nature of the problem of inhalant use and abuse in selected countries in this region, A description of the problem in each country is presented first, followed by an overall analysis of the problem in the region. General trends and patterns

of inhalant abuse, characteristics of abusers and risk populations, and social and health consequences are described.

REGIONAL ANALYSIS

Australia

The practice of glue inhalation emerged in the late 1960s in Australia. This phenomenon and issues arising from it have received considerable attention in this country, including media coverage, political attention, research interest, and development of service programs.

Extensive research into various dimensions of the problem of inhalant abuse has been carried out in Australia. Studies have focused on school students in various States (such as Queensland, Victoria, and New South Wales), as well as community groups (Brady 1990).

A school survey conducted in 1974 in Queensland revealed that 6.5 percent of school children (both primary and secondary) had used inhalants and that 3.4 percent reported actively using during the time of the study. A higher prevalence of sniffing was found among the primary school students. Significantly more users in primary schools were males. Significantly more males than females were users overall (8.1 percent versus 4.9 percent) (Edmondson 1988).

Another survey of 4,165 secondary students in New South Wales in 1983 found that, after analgesics and alcohol, solvents and aerosols were the most commonly abused substances (Edmonson 1988). About half (46 percent) of the students reported having experimented with sniffing. Sniffing of solvents and aerosols was most common among early adolescents (ages 13 and 14) and, in particular, among 13-year-old girls, 13 percent of whom were found to be sniffing on a regular basis, compared to only 6.4 percent of males. However, while the prevalence of solvent abuse was relatively high, only 1 percent were chronic users (i.e., daily use).

No common features of usage patterns, social class, or specific locale were found, although the study indicated that children who were out of the home at night, who were inclined to play truant, and who received large amounts of pocket money tended to abuse solvents. The most important factor with regard to substance abuse was the individual's

perception of the danger inherent in inhalant abuse. Students who were unaware or skeptical of the risks of injury from sniffing were more likely to be volatile solvent abusers. The practice of sniffing usually was transitional, with the great majority of adolescents growing out of the practice.

The most popular volatile substance abused is glue, followed by gasoline, thinner, household aerosols, and lighter fluids. Statistics on Australian fatalities from the inhalation of volatile solvents and aerosols are limited. A national survey carried out by the Aerosol Association in Australia (Edmonson 1988) reported 34 deaths over the period from 1974 to 1983. The ages of the victims ranged from 12 to 24 years, with a median age of 16.4 years. A cooking spray containing the propellant Fl 1 and hydrocarbon was the most common substance involved in these fatalities.

Some Australian States have adopted legislative measures as one approach to the control of abuse of volatile solvents. For example, in Queensland, the Poisons Regulations were amended in 1983 to require that glues containing volatile solvents be placed out of reach of the public. Under the New South Wales poisons legislation, warning labels are required on products specified in the regulations. In South Australia, the Controlled Substances Bill of 1983 has provisions whereby a person who supplies volatile solvents for purposes of inhalation is liable to a fine or 2 years' imprisonment.

Brunei Darussalam

Inhalant abuse was first reported in 1988 in Brunei Darussalam. Information obtained from arrests and referrals made by law enforcement agencies, educational institutions, parents, employers, and the public indicates that the prevalence of cases reported remained low. From 1989 to 1992, only 92 inhalant abusers had volunteered for supervision and counseling. More than 90 percent of these cases were indigenous males under the age of 20 years. Two-thirds were students, while the rest were unemployed (Anti-Drug Association, personal communication, May 19, 1993).

Abuse of these substances was mainly on an experimental basis, motivated by boredom, lack of discipline, peer influence, and lack of family attention (Anti-Drug Association, personal communication, May 19, 1993). The types of inhalants commonly abused included toluene and several types of glue, thinner, and varnish. These substances are

easily purchased over the counter and usually are used in hand-held containers and plastic bags. A small number of inhalant abusers sometimes experiment with psychotropic pills, with some progressing to other drugs such as cough mixtures that contain codeine. Some abusers were observed to have signs of psychiatric conditions, such as confused or delusional states, anxiety syndromes, or depression.

There are no treatment facilities for inhalant abuse other than supervision and counseling in Brunei Darussalam. Preventive strategies involve drug education through lectures and exhibitions, as well as urine screening of individuals suspected of using drugs carried out by the Preventive Drug Education Unit of the Narcotics Control Bureau in schools, Government departments, and public places.

The Emergency (Intoxicating Substances) Order of 1991, which took effect in May 1992, could be used against inhalant abusers. In it is a provision empowering the Commissioner of Police to require a person suspected of abusing inhalants to be medically examined or observed by a medical practitioner. If as a result of the medical examination it is found that such a person requires treatment, the law may require attendance at an approved institution for treatment.

Hong Kong

Statistics on organic solvent abuse first were compiled in 1989 in Hong Kong. However, it is not known when abuse of these substances first emerged. Since 1989 only a small proportion of annual cases (less than 0.5 percent) recorded in the Central Registry of Drug Abuse involved abuse of organic solvents. Only five cases were recorded in 1989. The number increased to 24 cases in 1992. Those cases represent about 2 percent of newly reported persons under the age of 21 each year. Between 1989 and 1992, 56 cases were registered. Most of the abusers were males under 21 who had 7 to 9 years of schooling. More than half also used other drugs such as cough mixture and cannabis. Available official data indicate an increasing trend of inhalant abuse. Overall, inhalant abuse has received very little coverage in Hong Kong. No treatment or prevention efforts have been initiated so far (W. Tang, personal communication, April 1, 1993).

Malaysia

In Malaysia, the abuse of organic volatile solvents has been observed since the early 1980s. The problem of solvent abuse is predominant in East Malaysia (i.e., Sabah and Sarawak) and in Johore—the southern part of West Malaysia bordering Singapore (Navaratnam 1988). The national registry of drug abusers in Malaysia does not require the reporting of drug abusers, and there are no national statistics on the extent and nature of the problem as such. However, there are some data available from police records and education departments in some States. In Sarawak, inhalant abusers are reported to the police, who in turn report the matter to the State department of education if school students are involved. School children (ages 7 to 19) abusing inhalants in the school compound are reported only to the school authorities. Inhalant abuse cases registered with the police between January 1983 and June 1990 in Sarawak totalled 988 cases (table 1). The number of cases reported in 1983 was 101, rising to a peak of 204 in 1986 and declining to 74 in 1989 (Sharifah 1990).

TABLE 1. *Inhalant abusers registered by the police, Sarawak (January 1983-June 1990).*

Year	January 1983	1984	1985	1986	1987	1988	1989	June 1990	TOTAL
N	101	165	125	204	196	102	74	21	998

SOURCE: Sharifah (1990).

In Sarawak, this problem occurs in both urban and rural areas. A study of the profile of the cases reported in Sarawak revealed that all racial groups are involved (Sharifah 1990). Thirty-three percent of reported abusers were students, and 40 percent were unemployed. Sixty-two percent were younger than 18 years old, while 25 percent were between 18 and 21 years of age. A great majority were males.

The trend of inhalant abuse in Malaysia has remained stable during the last 5 years, in contrast to other countries in the region, especially Thailand and Singapore. The types of substances abused include paint thinner, nail polish remover, gasoline, and glue. The most commonly abused inhalant is glue.

Preventive education on the various aspects of inhalant abuse and its harmful effects has been carried out as part of preventive education on drug abuse in Malaysia. In the affected states, pamphlets on inhalant use have been produced by the departments of education for use in schools. Resource guides on inhalant abuse have been produced by the Government for health and welfare professionals and teachers.

Detected inhalant abusers of school age are provided counseling by teachers and subjected to disciplinary action. Police report nonschool children to parents for supervision.

Presently, no legislation in Malaysia relates specifically to the abuse of inhalants. Nonetheless, existing legislation (i.e., the Juvenile Courts Act of 1947) could be used to a limited extent to help children or adolescents younger than 16 years old who are inhalant abusers. They can be placed in an approved home by the juvenile court, The police also can charge inhalant abusers under the Minor Offense Ordinance of 1955 if they also disturb the peace in the process of abusing.

New Zealand

In New Zealand, the problem of solvent abuse emerged in the early 1980s. There is no systematic collection of data on the prevalence of solvent abuse. However, data available from a variety of sources (i.e., community workers and police) are considered to reflect the situation fairly accurately. The Ministry of Youth Affairs had provided some estimates of the number of solvent abusers in New Zealand (1986-1991). An estimate of 650 solvent abusers between 13 and 16 years of age was made in May 1986. Estimates for 1987, 1990, and 1991 have been between 1,500 and 1,600 per year. There reportedly is an increase in the problem during the summer months, but solvent abuse has remained stable over the last few years (Meredith 1992).

The substances that are most misused by young people are glue, toluene, and polyurethane spray varnish and spray paints, usually flurocarbons.

The primary method of use is sniffing from a plastic bag. On rare occasions some substances are made into a cocktail and drunk (e.g., kerosene and cola, methylated spirits and orange juice or cola, and gasoline and cola). Volatile solvents are readily available to young people in New Zealand.

Most of the inhalant abusers are within the 14- to 18-year-old age group, although recently the age of these abusers has been slightly younger. Early experimenters were found in the 10- to 13-year-old age bracket. In several cities in New Zealand, there is an older age group (20-25 years) of solvent users. Sniffers predominantly are male, either school students or unemployed. Most come from low- to middle-income families. Solvent abusers often congregate in large groups and are highly visible. Boredom, peer pressure abuse (which includes sexual abuse among young women), and families who use excessive amounts of alcohol are factors that have been related to use of solvents (Meredith 1992). The visible groups of solvent abusers are usually Maori, the indigenous New Zealanders. However, there are users of European descent who are less visible. Solvent abusers come from a range of educational backgrounds. Some are low achievers, while others are average to high achievers. Polydrug use is quite common. Many solvent abusers also have access to alcohol and cannabis (Arnold 1983; Birdling 1981).

Solvent-related mortality data have been recorded since 1977. For the period from 1977 to 1992, 47 deaths as a consequence of solvent inhalation were reported. About 80 percent of these abusers were male, and 74 percent of them were younger than 20. The most common solvents in these cases were gasoline, toluene, benzene, trichloroethane, and bromochlorofluroethane, which is used in fire extinguishers (Meredith 1992).

There is no national law against inhalant abuse. Only two cities have by-laws prohibiting solvent abuse within city boundaries. Attempts have been made to restrict the sale of solvents through legislation.

New Zealand has developed a range of strategies that have assisted in the reduction of the problem. Most of these efforts are supported by local community organizations and are funded by the Government. Support services include daily activities, drop-ins, street workers, referral to residential programs, family counseling, and referral to addiction counsellors. Group work approaches have shown some success, and

community-based programs are the most effective for the majority of young people.

The Philippines

In the Philippines, the abuse of organic solvents has gained popularity since the early 1970s. This was believed to be partly related to the decline in the availability of illicit drugs such as heroin and morphine. Information on inhalant abuse is collected from community- and school-based surveys and reports from drug treatment and rehabilitation centers.

In 1981, only 42 cases were detected, but this figure increased to 133 in the first 11 months of 1985 (Navaratnam 1988). In 1992 alone, a 79-percent increase in the abuse of a local brand of household glue was reported compared to the previous year (D.V. Varela, personal communication, May 21, 1993). A recent study of drug abusers admitted into drug treatment facilities in Manila in 1992 shows that 5.5 percent of 310 clients admitted last year primarily were inhalant users (Dangerous Drugs Board, unpublished data). There has been a steady increase in the number of reported cases of inhalant abuse, particularly the abuse of household glue, from various inpatient and outpatient rehabilitation facilities in the past 5 years. One brand of household glue was included in a list of the 10 most commonly abused drugs in the Philippines in 1992 (Dangerous Drug Board, unpublished data).

Solvent abusers in this country predominantly are males who are out of school or school dropouts. They primarily are engaged in street jobs such as selling newspapers, rugs, or flowers and come from very poor families. They are about 6 years younger than the general population of drug abusers, as indicated by their mean age of 15 years old. Moreover, a significant percentage (40 percent) are involved in antisocial activities such as stealing and prostitution. A recent study of the social, psychological, and demographic profiles of 64 self-confessed inhalant abusers referred to the Treatment and Rehabilitation Division of the Dangerous Drugs Board showed that the inhalant abusers are emotionally laden and have a strong need for acceptance, affection, trust, and confidence (Dangerous Drugs Board, unpublished data). This may be related to the fact that most of them were brought up by single parents or were abandoned completely by both parents and relatives. They are persons with low self-esteem who are evasive towards people in authority and have limited interpersonal relationships. A majority of the abusers are considered as regular or compulsive users of volatile substances, using

them at least two to three times per week (D.V. Varela, personal communication, May 21, 1993).

In the Philippines, inhalant abuse primarily is a peer-perpetuated activity. Peer influence represents a significant factor, particularly in initiating inhalant use. Furthermore, easy availability and affordable price are the other reasons reported for starting and continuing the use of such substances. In addition, favorable effects experienced by the user such as "lightness," numbness of the whole being or body, absence of hunger pains, and fullness of the stomach contribute to the continued use of inhalants.

Household glue is the most widely abused volatile substance. Other available volatile substances include nail polish remover, acetone, paint, lacquer, thinner, floor polisher, insecticide spray, and gasoline. The most common methods of inhaling these substances is through the use of plastic bags (particularly for household glue) and use of rugs or cotton cloth for such volatile substances as solvent and acetone. There are instances when such substances are hand held and sniffed directly from the container.

Most Filipino solvent abusers are polydrug abusers. Marijuana appears to be the favorite drug of abuse, followed by cough preparations. Alcohol and tobacco use also are very common among this group.

Although there has been no medical research on the health effects of inhalant abuse in the Phillippines, the problem of inhalant abuse has become a serious cause of concern among those involved in the prevention and control of drug abuse. It has precipitated the establishment of more treatment facilities for inhalant-abusing street children. In Manila, there are three inpatient facilities operating in the city and accredited by the Dangerous Drugs Board that provide a home to street children. These programs provide residential care, social services, medical services, psychiatric and psychological services, educational and vocational training, sports and recreation opportunities, talent development, job placement, and involvement in income-generating projects.

Preventive approaches adopted include a nationwide drug information campaign that covered solvent-inhalant abuse and provided street-based counseling services. The Government, through the Department of Social Welfare, has provided livelihood opportunities for street children who are inhalant abusers. Presidential Decree 1619, which was promulgated in

1979, imposes criminal sanctions on those who use, possess, or engage in the unauthorized sale of volatile substances to minors.

Republic of Korea

In the Republic of Korea, the pattern of drug abuse has changed over the past three decades. Opium was most popular in the 1960s cannabis in the 1970s and methamphetamine from the late 1970s to the 1980s. Stringent control through enactment of new laws for combating drug trafficking and manufacturing has reduced the problem of abuse of these drugs. However, sniffing of volatile substances such as adhesives, organic solvents, and gases that are not under the drug control regulations has been noted since the late 1970s and early 1980s (D.H. Lee, personal communication, May 20, 1993).

Data collected by law enforcement agencies indicate that there was an increase in number of offenders from 2,243 in 1988 to 3,995 in 1992 (table 2). Of the offenders reported in 1992, 86 percent are male and are below the age of 20. Fifty percent of these offenders are unemployed,

TABLE 2. *Number of offenders who have violated the Harmful Chemical Law, Republic of Korea (1988-1992).*

Year	1988	1989	1990	1991	1992	TOTAL
N	2,243	2,032	2,352	2,882	3,995	13,504

SOURCE: D.H. Lee (unpublished data); D.H. Lee (personal communication, May 20, 1993).

while 31.5 percent are students. Other occupations include entertainment (4.1 percent), industrial work (4.2 percent), and manual labor (2.1 percent).

All inhalant abusers started with experimental use and later progressed to occasional or long-term continuous use. A minority have used inhalants for more than 5 years.

Curiosity is the most popular motivating factor for initial use of inhalants. These substances were chosen primarily because of their easy availability, low cost, rapid onset of effect, and their convenient packaging in small containers that easily can be concealed. In Korea, solvent abuse is a particular threat to children and adolescents living in poverty.

Butane gas and glues containing toluene are the most popular inhalant and solvent in Korea. They are sold widely and can be purchased easily over the counter. Abusers commonly inhale butane using the gas can and a plastic bag and use tubes to inhale glues.

The use of inhalants and solvents often is the first step along a route to the use of other drugs such as dextromethorphan hydrobromide and benzalkonium chloride.

Antidrug and harmful chemical campaigns targeted at adolescents and middle and high school students have been carried out. The Korean Government has provided special education to middle and high school teachers for prevention of inhalant and solvent abuse.

Individuals using glues or thinners for purpose of hallucination and stimulation or selling these chemical substances can be charged under the Harmful Chemical Control Law. This includes substances such as toluene, ethyl acetate, and methyl alcohol.

Singapore

Inhalant abuse first was detected in Singapore in 1979. It has become a serious problem in the last decade (Singapore Anti-Narcotics Association 1988). Data on inhalant abusers are compiled by the Central Registry of Drug Abusers. In 1980, when monitoring began, 24 inhalant abusers were detected. This figure rose sharply to 763 in 1984 and to 1,112 in 1987; the total number of abusers was 3,610 over the 8-year period (figure 1). A steep decline was reported in 1988 to 648, compared to the previous year. A gradual decline was observed from 1989 to 1992. In the early part of 1993 (January-May), only 101 cases were reported (Central Narcotics Bureau, unpublished data).

This upward trend since the early 1980s to a peak in 1987 could be a result of increased efforts in detection. This also may suggest a genuine increase in the problem of inhalant abuse during that period as narcotic addicts resorted to inhalant use as a substitute because of the stringent

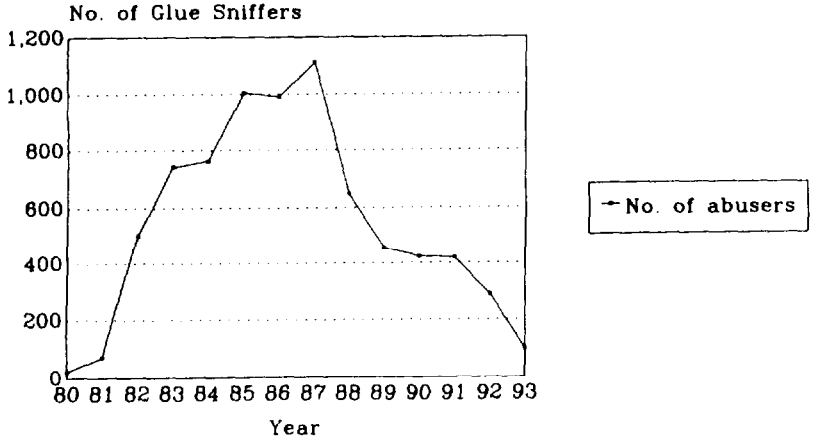

FIGURE 1. *Number of glue sniffers detected in Singapore by year.*

control of heroin abuse. The enactment of the Intoxicating Substances Act of 1987, which has made inhalant abuse an offense, probably has deterred the abuse of inhalants, thus resulting in the gradual decline since 1988.

The involvement in glue sniffing by an increasing number of young people has become an issue of great concern in Singapore. Of the total number of 1,112 inhalant abusers detected in 1987, 194 (or 17.4 percent) were younger than 15 years old, while 640 (or 57.5 percent) were between 15 and 19 years old. A growing number of school students (ages 7 to 19) were involved, too. In 1987, 140 (or 12.6 percent) of the 1,112 inhalant abusers detected were schoolchildren.

In Singapore, the most commonly abused substance is the rubber-solution glue usually sold by and used in bicycle repair shops. More than 95 percent of inhalant abusers abused this glue. Other inhalants abused include a range of adhesives, petroleum products, paint thinners, and plastic cements.

Three common methods of inhaling are used in Singapore (Navaratnam 1988). These are:

- Inhaling from containers: The abusers inhale the volatile material directly from the container.

- Inhaling from a plastic bag: The volatile material is placed in a plastic bag, and the abusers inhale the vapor that is emitted.

- Inhaling from cloth: The volatile material is placed on a piece of cloth and spread evenly. The abusers then inhale the vapors emitted.

Some of the common factors contributing to inhalant abuse among the young people in Singapore include peer influence, curiosity, lack of parental guidance, boredom, easy availability of the substances, and the quick-high effect of inhalation of intoxicating substances.

Adverse health consequences due to volatile solvents have been reported. By 1987, there had been 23 cases of deaths associated with glue sniffing. They were a result of accidents (such as drowning) or suicide. Eleven abusers have suffered brain damage, primarily in the form of cognitive dysfunction such as impaired perception, reasoning, and memory. The persistent presence of repeaters detected indicates that some of the inhalant abusers could have developed psychological dependence on inhalants; about 20 percent of the 1,112 abusers detected in 1987 had been contacted five times or more by the police or officers of the Central Bureau, Singapore. Violent behavior as a result of glue sniffing also has been reported.

The social consequences of inhalant abuse are diverse. Family life often is disrupted because of glue-sniffing incidents. The teenager who is dependent on inhaling these substances tends to neglect schoolwork, interests, and personal hygiene (Singapore Anti-Narcotics Association 1988).

Several measures have been introduced by the Singapore Government to curb the indiscriminate use of inhalants. These include the enactment of the Intoxicating Substance Act of 1987, which makes inhalant abuse an offense by law. Under the act, suspected inhalant abusers can be subjected to blood tests. Those detected for the first time can be placed under the supervision of officers from the Central Narcotics Bureau. Recalcitrant offenders may be admitted for treatment and rehabilitation in approved institutions and afterwards are placed under supervision. Those who breach the supervision are punished.

In addition to these deterrent measures and legislation, a 3-month anti-glue-sniffing and anti-inhalant abuse campaign was launched in 1988.

Thailand

During the 1980s Thailand suffered the first epidemic of organic industrial solvent sniffing among adolescents (Pemgpam et al. 1992). There was a rapid increase in the proportion of inhalant users within the total drug dependence treatment population between 1980 and 1989. This increase appeared to be countrywide. The increasing trend was significantly marked in the adolescent group. By the end of the decade organic solvent users surpassed users of all other substances in the northeastern region of Thailand. Adolescents aged 13-17 are the most vulnerable. The epidemic varied among the regions (Bangkok, central, northern, northeastern, and southern). In Bangkok, the epidemic started some time in the 1970s. It began in the other provincial regions in the early 1980s with the southern region being the most recent to experience the epidemic. The number of inhalant abusers increased in the last 5 years (Dasananjali, personal communication, May 12, 1993). An increasing number of children were admitted for treatment in recent years.

Information was gathered by the national information system on all drug dependents who volunteered for treatment services in Thailand. Based on this information, about 2 percent of the total population in treatment (N = 58,327) between October 1989 and September 1990 were primary inhalant abusers (Office of the Narcotics Control Board 1992). Of the overall total, 13,984 were new cases entering treatment for the first time.

Slightly more than 4 percent (N = 583) of the new cases were being treated for inhalant abuse. More than 90 percent of these inhalant abusers were males. Sixty percent were younger than 20 years old (51 percent were between 15 and 19). Slightly more than 33 percent were in their twenties. Ninety percent were never married. Twenty percent of these inhalant abusers were students, and 39 percent were unemployed. Among the employed, a majority were hired as wage laborers. Eighty-one percent of these inhalant abusers had initiated drug use before the age of 20. Inhalants were the first drug of abuse among 92 percent of these users. A sizeable proportion (18 percent) were polydrug users. Heroin, ganja, and psychotropic drugs were secondary substances used among this latter group.

About half (47 percent) of these inhalant abusers use once a day, 25 percent use two to three times daily, and the rest use more than three times daily. Seventy-five percent of them spent between 1 and 20 baht

(between US $0.04 and US $0.80) a day on inhalants. However, there were some (4 percent) who spent more than 100 baht (or US $4.00) daily.

About 57 percent of these inhalant users sought treatment because of self-motivation. About 33 percent were pressured into seeking treatment by their family. Legal pressure was a reason reported by a minority (5 percent). Seventy-one percent of them had received inpatient treatment, and the rest were treated as outpatients.

Curiosity was the most commonly reported reason for initiating inhalant use. This was mentioned by 61 percent of inhalant abusers who received treatment. Twenty-three percent had the drugs introduced to them by friends. Psychological stress was cited by 10 percent of the abusers.

The organic (industrial) solvents most frequently used included paint thinners containing toluene, lacquer, and glue. Toluene was the most commonly abused.

The increasing extent of the inhalant abuse problem led to the enactment of the Act on the Prevention of Inhalant Use BE 2533 (1990). Under this law, sale of inhalant substances to children under 17 years old is prohibited. Prevention education has been implemented as another control measure.

OTHER INFORMATION

Several other countries in the region are involved in the Asian Multicity Epidemiology Study, which is coordinated by the Centre for Drug Research, Universiti Sains Malaysia. They include Bangladesh (Dhaka), Indonesia (Jakarta), Myanmar (Yangon), Nepal (Kathmandu), Sri Lanka (Colombo), and India (Delhi, Madras, Varanasi). Monthly statistics on the extent and nature of drug abuse in each city that are obtained from law enforcement and treatment agencies are submitted to the coordinating center. Data from these countries indicate that there are no cases of inhalant abuse that are reported routinely. Only the city of Colombo mentioned that inhalant abusers were noted occasionally.

SUMMARY AND CONCLUSIONS

Regional Trends in Solvent Use

Given the lack of valid prevalence data for all of the countries, the available information provides only some suggestive evidence of the inhalant abuse situation in each country.

This analysis shows that the problem of inhalant abuse has emerged and has gradually increased in magnitude in most countries in the Asia and Pacific region over the last decade. Countries such as the Philippines, which have experienced this phenomenon for a comparatively longer time, still are observing an increasing trend in indicators of abuse. In some others such as Australia, Malaysia, New Zealand, and Thailand, a stable trend has been observed. In Singapore, a significant decline was observed in the last 5 years. In the case of Hong Kong, inhalant abuse has been taken note of only recently, and it is reported to be on the rise.

Characteristics of Inhalant Abusers

Relatively little attention has been paid to the characteristics of volatile solvent abusers. Most studies have been limited to age, sex, and occupational category. This section highlights some of the common features of this specific group of abusers observed in countries in the region.

Demographic Characteristics. It is clear that inhalant abusers are typically adolescents (between the ages of 13 and 17). In some countries, such as Australia, relatively high prevalence is reported among primary school students. Thus, experimentation with inhalants would have started even at a younger age. In New Zealand, the age of initiation into inhalant use usually is younger than 14 years of age.

All countries reported that males predominate among inhalant abusers. The employment status of these abusers varies somewhat between countries. School students form a sizeable proportion (one-quarter to one-third of total abusers) in most countries. In New Zealand and Brunei Darussalam, students are the major group.

Social and Psychological Factors. Several social characteristics of inhalant abusers appear to be important. In New South Wales, Australia, abuse of these substances was found to be higher among students who are

truant, who have money, and who are unaware of the harmful effects of inhalants. In several countries, sniffing was most common among those who were neglected by their families and when drug use also was present in the family. Boredom, peer influence, curiosity, and lack of discipline were other factors identified as associated with inhalant abuse. A study on the psychological profile of inhalant abusers in the Philippines showed that they were highly emotional and have a strong need for acceptance, affection, and trust. They also had low self-esteem.

Pattern of Inhalant Use. Among the reasons for inhalant abuse are the easy availability, easy accessibility, and affordable price of various substances. The quick-high effect is another attractive factor.

The pattern of inhalant abuse appears to differ between the countries. For example, in Australia and Brunei Darussalam, inhalant abuse mainly is experimental and transitional, and it lasts for a short duration. This is in contrast with the Philippines and Thailand, where use and abuse usually are of an ongoing and compulsive nature. This difference, if valid, will provide an indicator of the severity of the problem in some countries in the region. However, since the sources of information and study population are varied, this observation is nonconclusive.

In most countries, a sizeable proportion of experimenters would progress to become regular users of these substances. In some instances, inhalant abuse was found to precede other forms of drug use. Polydrug use also is a common feature among inhalant users in some countries (e.g., the Philippines and New Zealand).

In summary, evidence from the various countries in the region shows that inhalant abuse typically begins in late childhood and early adolescence. In a majority of cases, use is experimental and short lived. Heavy patterns of abuse are found among a minority of cases. Glue containing toluene is the most common inhalant abused in most of the countries. There is a wide range of other volatile substances that are used, including gasoline, thinner, adhesive, and varnish.

Social and Health Consequences of Inhalant Abuse

Only five of the nine countries examined here have some information on adverse health consequences of inhalant abuse. There have been numerous deaths attributed to inhalant toxicity during the last 15 to 20 years. Some of the substances involved in these deaths include gasoline,

toluene, benzene, and hydrocarbons. Furthermore, some chronic abusers were found to manifest signs of mental disorder, electroencephalogram abnormalities, malignant anemia, brain damage, and violent behavior. Other associated effects of inhalant abuse include accidents and aggravation of other illnesses. Criminal behavior was found to be related to inhalant abuse. Some social effects include disruption of family life and lack of interest in schoolwork and personal hygiene among the users.

Preventive Intervention and Treatment

All countries have indicated great concern about the inhalant abuse problem. Preventive strategies have been implemented as a means of control, mainly through health education targeted at the young population. Drug treatment facilities in some countries such as Thailand, the Philippines, and Singapore have accommodated inhalant abusers. They include both inpatient and outpatient services. Supervision and counseling programs are available in most countries. A multidimensional approach to prevention of inhalant abuse that involves various groups and settings such as schools, the community, and social workers was found to be an effective means to address the problem.

Some form of legislative control of inhalant abuse is present in most countries. However, the degree of severity of control differs among the countries.

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Inhalant Abuse in Bolivia

Laura Edith Baldivieso

The purpose of this chapter is to provide a general overview of the extent and nature of the inhalant use problem in Bolivia. Data were derived from a comprehensive review of the literature on drug abuse in Bolivia. Additionally, information is provided on the socioeconomic condition of Bolivians, particularly the plight of children living in the streets. The impact of Bolivia's economic conditions on the growing problem of street children and on the problem of inhalant use also are discussed.

BOLIVIA: THE COUNTRY

Bolivia is one of two landlocked countries in South America. Currently, the population of Bolivia is approximately 6,420,792 (Instituto Nacional de Estadistica 1993). Data from the 1992 national household census shows that approximately 42 percent of the population is under the age of 15 (see figure 1). Additionally, the 1992 census shows that Bolivia is one of the poorest countries in the western hemisphere, with 80 percent of the population living in poverty.

Data from several other sources provide a grim picture of Bolivian youth. A study conducted by Ardaya and Domic (1991) found that approximately 290,000 children under the age of 15 are either working or living in the streets or are institutionalized. This represents about 10.8 percent of individuals under the age of 15 living in Bolivia. This significantly high number of youth living in Bolivia in extreme poverty conditions has created an environment conducive to the abuse of drugs, particularly inhalants, which are readily available everywhere in the country (see figure 2).

INHALANT USE

A review of the literature shows that 9 of 27 studies that have collected data on the illicit drug use behavior of Bolivians included information on the use of inhalants (see table 1). Of these nine studies only two studies, Roth and colleagues (unpublished manuscript) and ABC Communication

- Population, 0-15 years of age — 2,969,732 persons
  —This is equal to 42 percent of the total population.

- Population, 0-5 years of age — 950,227 persons
  —This is equal to 14.8 percent of the total population.

- School-based
  —6-14 years of age — 83.9 percent of the population
  —15-19 years of age — 52.7 percent of the population

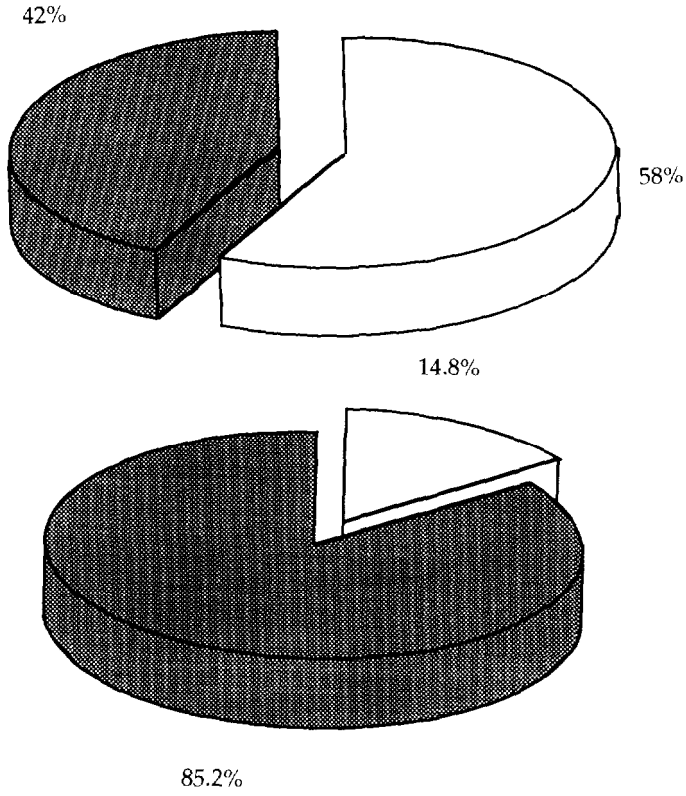

FIGURE 1. *Bolivia population, 0-15 years of age*

• Children working in the streets	280,000 (96.3 percent)
• Homeless children	2,500 (0.9 percent)
• Children in institutions	8,000 (2.8 percent)
	290,500 (100 percent)

These figures correspond to:

- 10.8 percent of the total number of children ages 6 to 10.
- 25 percent of the economically active population.

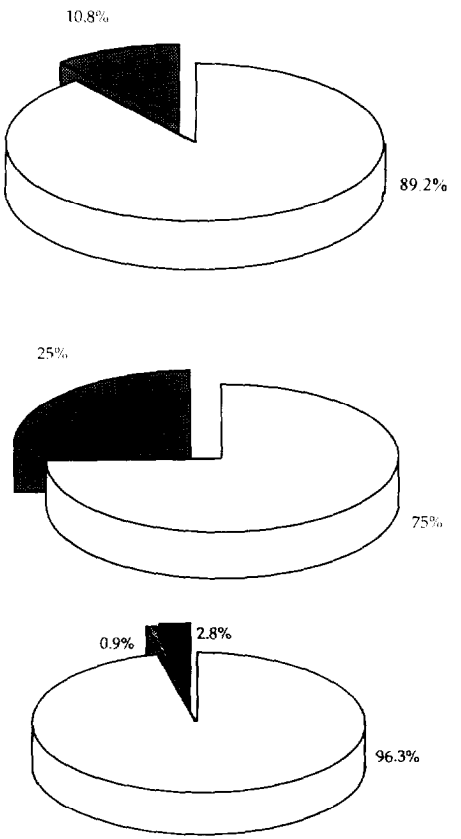

FIGURE 2. *Street children and children at high risk of using drugs*

TABLE 1. *Drugs most used (lifetime prevalence).*

Author	Marijuana	Psicofárm Rohypnol	Coca paste	Chloro-hydrates	Inhalants	Glue	Thinner	Gasoline	Gasoline + Thinner	Alcohol	Tobacco	Hallu-cinogens	Ampheta-mines
Rothetal. (unpub manu)	+(1)	+	+	+	+								
ABC (1986)	36.69%	8.8%	38.63%	6.35%	7.54%								
Cruz Roja (1986)	36.25%			8.75%	12.56%								
CESE (1990. 1991.1992) 4,800 atenclones c/añ0	25% 18% 10%	6%	60% 40% 45%	10% 16% 25%	6% 7%					14% 10%			5% 3%
Universidad Santa Cruz (1991)	25.63%	8.65%	19.02%	15.27%	5.76%					6.92%			
CONAPRE (1992)	2.67%	1.73%		2.08%	2.98%					40.50%	27.35%	I 19%	1.57%
LA PAZ (1993) abandoned children who use drugs						100%	63%	2%	45%	62%	20%		
CBBA (1993) abandoned children who use drugs			10%			90%							
SANTA CRUZ (1993) abandoned children who use drugs	3%	3%	5.3%		100%	100%	5%	7.5%	3%				

KEY: + = Research indicates more consumption of this drug but does not report percentages.

(1986), collected data on the prevalence of inhalant use in the general population. The other seven studies involved the collection of data on populations living in large urban areas. Since the ABC Communication survey, no data have been collected on inhalant use among Bolivians living in rural areas or small towns. Given the changes in drug-using behavior of Bolivians in the past 7 years, the lack of data on the use of inhalants in the general Bolivian population is a significant gap.

Moreover, serious methodological problems exist in the majority of those studies that have collected data on inhalant use. The age of the respondents in three of the nine studies on inhalant use is unknown. Further, the questionnaires utilized in seven of the nine studies were not pretested to determine whether the questions on inhalant use were appropriate for the population under study. Many of the scales involved simple translation of drug abuse instruments from foreign countries without regard to cultural differences, which may affect the validity of the responses given by Bolivians.

Other methodological problems found in these studies included the lack of information on the sample size and the procedures utilized to identify and select subjects to participate in the studies. Thus, it is no surprise that the findings from each of these studies resulted in different conclusions on the prevalence of inhalant use in different parts of the country.

Despite these serious methodological problems, the results from some of these studies, particularly those involving the collection of data among youth at risk of using inhalants, have provided important information on the extent of the inhalant use problem in Bolivia. The three studies conducted by Centro Educativo Sobre Estupefacientes (CESE) in 1993 among children living in the streets (table 2) suggest a high lifetime prevalence of inhalant use among these youth (Centro Educativo Sobre Estupefacientes, unpublished manuscript-*a*, unpublished manuscript-*b*, unpublished manuscript-*c*). Data collected from several community-based organizations serving street children in the cities of La Paz, Cochabamba, and Santa Cruz suggest that 100 percent of the youth interviewed in La Paz and Santa Cruz and 90 percent of the youth interviewed in Cochabamba used shoe polish. Additionally, 63 percent of the youth interviewed in La Paz reported using paint thinner. According to Baldivieso (1993), shoe polish, thinner, and gasoline are readily available and can be purchased with little money in each of the three cities. For example, a small container of shoe polish can be purchased for as little as 50 cents in each of the cities.

TABLE 2. *Drugs most used in three cities.*

	Alcohol	Tobacco	Glue	Thinner	Gasoline	Gasoline + Thinner	Coca paste	Marijuana	Rohypnol
LA PAZ									
ENDA	+++	+	+++	+++	+	++			
QHARURV	++		+++	++					
COCHABAMBA									
Sayaricuy			+++				+		
Casa Madre de Dios			+++						
San Martin			+++		+++		+		
CREA			+++						
SANTA CRUZ									
Hogar Santa Cruz			+++	+	+		+		
D.N.I.			+++	+	+			+	+
Mi Casa			+++					+	+
Encuentro			+++						+

KEY: +++ = high consumption; ++ = medium consumption; + = low consumption.
NOTE: Only ENDA and QHARURU included data on alcohol and tobacco.

Anecdotal information suggests that the long-term use of inhalants has a serious impact on the physical and psychological well-being of children living in the streets (Gisbert et al. 1991). The long-term use of inhalants has been found to lead to a reduction in personal inhibitions, fears, and emotional instability. It affects sleep patterns, leading to hallucinations and anxiety attacks. Many of the youngsters who use inhalants are mistreated and psychically abused by adults and their friends (Ardaya and Domic 1991).

The data from other studies showed the rate of inhalant use to range from a low lifetime prevalence of 3.0 percent in the Consejo Nacional De Prevención 1992 national survey to a high of 12.6 percent in the survey conducted by La Cruz Roja in 1986 on the drug-using behaviors of individuals ages 10-24 living in the city of La Paz. Overall, inhalants appear to be the most prevalent substances of abuse after alcohol, tobacco, marijuana, and coca paste.

FACTORS ASSOCIATED WITH INHALANT USE AMONG CHILDREN LIVING IN THE STREETS

Data from several studies have indicated that street children are more likely than children not living in the street to have low self-esteem (Montes 1987; Perotto and Baldivieso 1994; Rodriguez Rabanal 1989; Todd 1983). According to the authors, these children often commit criminal acts, get involved in fights, or display other antisocial behaviors as ways of dealing with their low self-image. They often are unable to show warmth and attachment toward other individuals fearing that, if they do, they will be viewed as weak individuals.

Generally, children living in the streets come from families in which there is a significant amount of violence, including child abuse, and parental drug use (Gisbert et al. 1991). Often these children are treated like adults, being forced to seek employment in order to provide income for their families. Most of the families live in extreme poverty, unable to provide the necessities needed by these children to survive. Many of the children do not receive adequate health care (i.e., vaccinations and physical exams) and, as a result, are confronted with a myriad of health problems and illnesses as they grow older (Ardaya and Domic 1991).

Faced with a lack of emotional and financial support from the family and aware that they may have to survive on their own, many of these youth

leave their households. The precipitating incident that leads to leaving the family household often is a traumatic one, such as a severe beating. At other times, it is provoked by a minor incident such as failing to come home at a specified time (Ardaya and Domic 1991). Sometimes children leave their homes and return to them after a short time on the streets. More often, however, the children never return.

Once in the streets, many of these children adopt a delinquent lifestyle, joining other children in similar situations to form roving gangs. These gangs serve as a source of support and protection from adults and corrupt police officers who victimize street children. Often, street children are introduced to the drug distribution world by other members of their gang. Their involvement in the drug business is seen by many of the children as a way of making a living. This particularly is true in the involvement of street children in the cocaine and marijuana distribution networks in Bolivia. The consumption of cocaine and marijuana often is followed by their involvement in drug-dealing activities (Ardaya and Domic 1991).

The initiation into the use of inhalants among street children is different from that of cocaine and marijuana. Often street children turn to inhalant use to moderate or reduce their feelings of hunger, to deal with the cold weather, to become accepted by their peers, to feel they fit in and are happy, or to forget their current condition. Once street children initiate inhalant use, they seldom stop their use. Only when they leave the environment of the streets or stabilize their street survival activities do many of the children stop their use (Asociación Drogadictos Anonimos 1987). According to Ardaya and Domic (1991), the use of inhalants among street children is a prelude to their involvement with other illicit drugs and a lifelong lifestyle of drug use.

Baldivieso (1993) has created a psychosocial model as shown in figure 3 that provides an overview of the pathways that lead to inhalant use among many of the children who live in the streets. This model is based on a conceptual framework that denotes the importance of socialization experiences in early childhood and the role of familial and socioeconomic factors in the inhalant-using behavior of youths at risk.

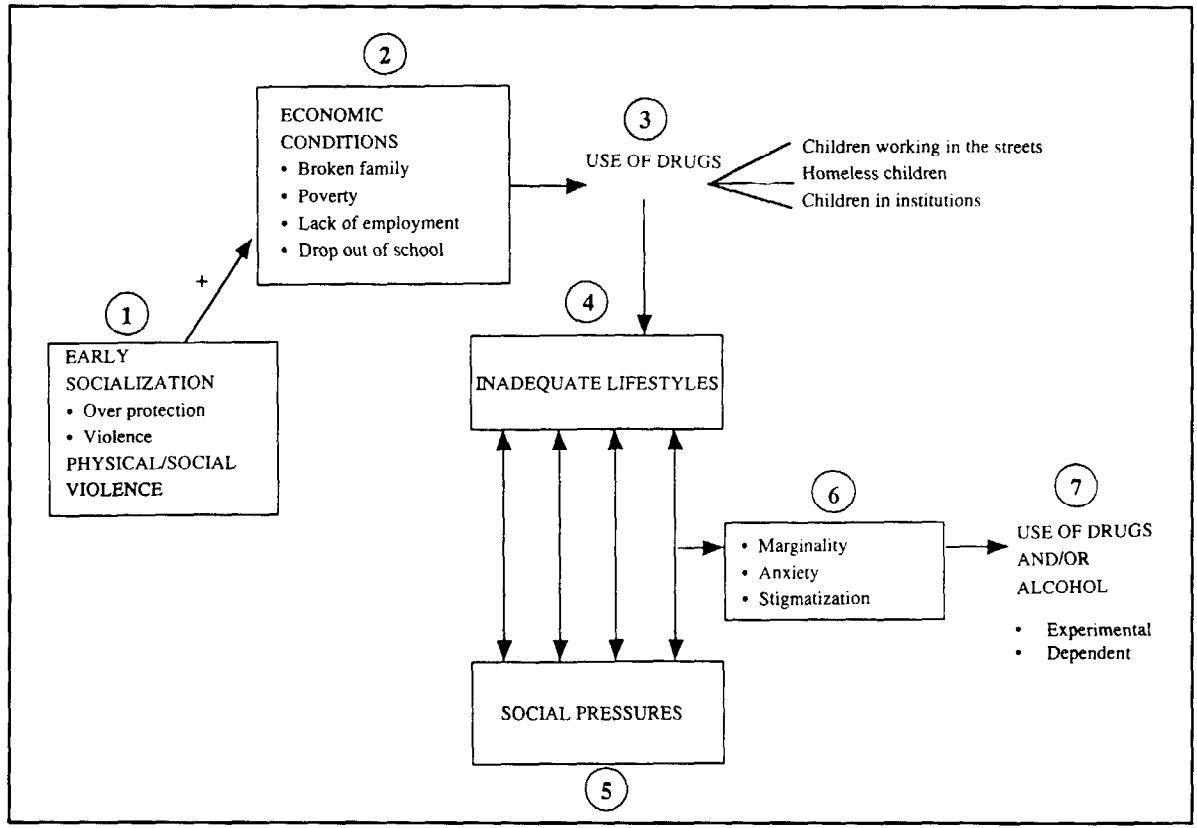

FIGURE 3. *Psychological process model of drug use.*

PREVENTION AND TREATMENT EFFORTS

Efforts to prevent the use of inhalants, especially among high-risk children in Bolivia, are nonexistent. No public organization currently exists to develop a comprehensive prevention campaign against inhalant abuse. The role of Government agencies in addressing inhalant abuse among high-risk children is limited to the criminal justice system. The criminal justice system at times has intervened when inhalant-using street children have committed crimes.

Overall, prevention efforts against the use of inhalant use have been left in the hands of private institutions such as CESE (Centro Educativo Sobre Estupefacientes 1991, 1992*a*, 1992*b*, 1993, 1994). CESE is a private, nonprofit organization whose main mission is to prevent the use of drugs in Bolivia. CESE is funded by the United States Agency for International Development and has offices in La Paz, Cochabamba, Santa Cruz, and Sucre. Prevention programs sponsored by CESE include: (1) prevention and education programs in numerous elementary and secondary schools in the above-mentioned cities; (2) a community-based prevention program that provides services to poor families whose children do not have access to schools; (3) a prevention program co-sponsored with the Catholic Church to provide information to parents of all social levels concerning the dangers of drug abuse; and (4) a telephone hotline that provides information about the dangers related to drug use and referral services to drug treatment programs. Other private organizations that provide drug abuse prevention and education services to the Bolivian population include Sistema Educativo Antidroga y de Movilización Social and United Nations International Children's Emergency Fund.

Treatment programs to address the problems of drug use in Bolivia are more readily available than prevention programs. A series of treatment models focusing on high-risk youth have been developed by private institutions. On the other hand, governmental efforts to develop drug abuse treatment programs have been nonexistent. The focus of the government in dealing with drug users continues to be one that follows criminal behavior. This approach seeks to change an individual's drug-using behavior through punishment or incarceration.

The focus of privately funded treatment programs is on the growing problem of children living in the streets. The emphasis of these programs is on getting these youth off the streets, not on addressing the drug-using

behavior. A secondary aim has been understanding the underlying factors responsible for their leaving home and the drug-using behavior.

Outreach and halfway house programs have been effective in getting hundreds of street children off the streets. Some of these programs only provide general information and referral to treatment programs, but others serve as safe havens where children can leave their belongings and take a shower or get a hot meal. Other programs have been developed so that children can live in a family-like setting with structured educational and vocational activities. Several of the programs provide extensive drug abuse counseling for the children identified as drug abusers.

It should be noted that no special treatment programs are available for children whose primary drug problem is inhalant abuse. Further, little information exists on the number of privately funded programs geared toward getting street children off the streets and addressing their deviant behaviors. Moreover, information on drug abuse treatment programs for more affluent members of the Bolivian society are not available.

THE BOLIVIAN GOVERNMENT'S POLICY TOWARD THE PROBLEM OF INHALANT USE

Currently, Bolivia has no comprehensive policy regarding inhalant abuse and other types of drug abuse. The current Bolivian Government policy is aimed at eradication of coca fields and the production of alternative crops in rural areas of the country. Moreover, the Bolivian Government has placed emphasis on the criminalization of drug use, and efforts undertaken by the Bolivian police have been to enforce current laws toward the consumption and trafficking of coca paste and marijuana.

The statutes passed by the Bolivian Congress and signed by the President into law in 1992 protecting the rights of minors in Bolivia have had little impact in dealing with the drug problem among youth at risk. The focus of this legislation has been on the economic survival of these minors. The problem of drug use as a health care concern has received little attention. Given these circumstances, it is unlikely that legislative efforts will be undertaken in the near future to develop a coherent policy concerning the growing problem of drug consumption in Bolivia.

In Bolivia there is a growing need to develop sound ethnographic research studies that could offer insights as to the underlying factors

responsible for inhalant use among high-risk youth. There also is a need to train a cadre of researchers that are capable of conducting sound quantitative and qualitative research studies on the problem of drug use in Bolivia. The data from this research can be utilized to develop more effective and efficient drug treatment and prevention programs geared toward addressing the growing inhalant problem in Bolivia.

CONCLUSION

The findings from the data reported in this chapter suggest that many street youth are exposed to multiple risk factors that affect their drug-using behaviors. These include having to join the labor force at a very early age, living in poverty, and existing in an environment where there are few opportunities for upward mobility. The findings also indicate that the problen: of inhalant abuse facing Bolivia is a serious one. With 10 percent of street youth using inhalants, Bolivia has a difficult and potentially explosive social problem that could overwhelm its social and health care systems. Of even more concern is the number of youth who are at risk of using inhalants and other drugs in Bolivia. Approximately 80 percent of all Bolivian youth are at risk of becoming serious inhalant or drug abusers.

Despite the progress made to address the problem of inhalant abuse among street children in Bolivia, little continues to be done by the public sector to address this growing problem. The Bolivian Government continues to treat the problem of inhalant use as criminal issue rather than a social and health care problem. To change this view of the problem, those who are in positions of power within the Bolivian society need to be educated about the causes and consequences of inhalant use and other drugs. However, the education of those who are in positions of power will depend on the further development of empirical information on the extent and nature of the inhalant abuse problem in Bolivia.

Thus, the development of further research on this topic and the training of drug abuse researchers in Bolivia is critical to the development of effective policies, strategies, and programs to address the serious problem of inhalant use. Steps to develop a sound empirical base for understanding the problem of inhalant abuse must be undertaken as soon as possible. Failure to do so could jeopardize whatever progress has been made so far in addressing this problem in Bolivia.

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Inhalant Use Among Brazilian Youths

Beatriz Carlini-Cotrim

In Brazil, inhalant abuse is an old phenomenon. As early as the 1920s a series of local medical articles focused on the so-called ether-inhaling vice, in which ether or the volatile product found in a common device called lança-perfume (meaning "perfume-thrower") was inhaled by young people in Brazilian cities (Lopes 1924, 1925). This device, a small metal container filled with ethyl chloride, usually was commercialized during Carnival, the 4-day festival that has become famous internationally. The original purpose of lança-perfume, as its name indicates, was to be used as a prank, in order to throw ice-cold jets of fragrance on people during the festivities. As such, it was bought and sold without any restrictions for many decades.

It appears that ether and ethyl chloride in the form of lança-perfume continued to be the major inhalant products to be abused in Brazil up to the 1960s (Neves-Manta 1956; Parreiras 1965). At that time, the production and commercialization of lança-perfume became illegal. This was the work of President Jânio Quadros. Although he resigned after only 8 months in office, the prohibition he issued endures to this day—as does the illegal consumption of lança-perfume. It now must enter the country illegally by way of Uruguay or Paraguay; alternatively, it is sold in a homemade version called loló.

Reports concerning other kinds of inhalant abuse began to appear in major Brazilian newspapers in the early 1980s. In most cases, they involved the use of glues or thinners (Carlini-Cotrim 1992). Typically, the abuse was reported among young lower income subjects living in large urban areas. Although such indications would necessitate scientific investigation of the subject, Brazilian epidemiological research on inhalant abuse is relatively limited. The research that is available is centered on the study of two population groups: young students and street children.

INHALANT ABUSE AMONG STUDENTS

The population of Brazil now is estimated to be approximately 150 million. Most of the population is young—40 percent are under 18 years of age. School attendance figures follow familiar Third World patterns: 83 percent of children between the ages of 7 and 14 (comprising the 8 years of mandatory schooling) attend school, and just 52 percent of those between the ages of 15 and 17 go to school (Instituto Brasileiro de Geografia e Estatistica 1987).

Available epidemiological data on drug use regarding this population consistently point to the fact that inhalants are the most frequently used drugs among Brazilian students nationwide, with the exception of alcohol and tobacco (table 1). Inhalant use figures surpass the use of over-the-counter drugs, marijuana, and cocaine (Carlini and Carlini-Cotrim 1993).

Furthermore, this preference for inhalants was reported not only in major cities but in smaller ones as well. It also seems to be present both in the public school system, which is attended by lower income children and adolescents, and in the private schools, frequented by students from upper and middle class backgrounds (Carlini and Carlini-Cotrim 1993) (table 2).

The products most frequently used by students are lança-perfume and loló. These are made clandestinely and sold illegally and are available exclusively for the purpose of drug abuse. In some cities, other products were found to be preferred: shoemaker's glue, gasoline, fingernail polish, and acetone (Carlini and Carlini-Cotrim 1993; Carlini et al. 1990).

As shown in table 3, boys reported a higher consumption rate than girls in all surveyed cities (Carlini and Carlini-Cotrim 1993; Carlini et al. 1990). However, previous data from lower income students in São Paulo (figure 1), suggest that girls have a curious preference towards inhaling beauty products, such as acetone and fingernail polish, when compared to their male peers. Further research is needed within a broader segment of the population to confirm this observation.

In this same local study focusing on the São Paulo student population, Carlini-Cotrim and Carlini (1988*a*) found that the total percentage of lifetime use of inhalant increases with age (table 4). However, the reverse is true when use within the previous 30 days is considered. Then inhalant

TABLE 1. *Lifetime prevalence of solvent, marijuana, and cocaine use among secondary students at public schools in 17 Brazilian cities, 1989.*

City	Percentage of users		
	Solvents	Marijuana	Cocaine
State Capitals			
Belém	13.8	2.9	0.2
Belo Horizonte	27.5	4.4	1.0
Brasília	14.8	4.0	0.6
Curitiba	13.0	2.8	0.4
Fortaleza	13.8	2.6	0.2
Porto Alegre	12.8	6.4	1.2
Recife	19.7	1.8	0.3
Rio de Janeiro	18.2	3.0	1.8
Salvador	17.6	1.6	0.4
São Paulo	21.6	4.7	1.2
Other Cities			
Bauru (SP)	19.6	2.5	0.4
Catanduva (SP)	23.8	4.5	1.1
E. S. Pinhal (SP)	28.5	7.1	2.3
Guarapuava (PR)	13.7	3.3	0.9
Piracicaba (SP)	27.2	6.2	1.1
Ponta Grossa (PR)	13.2	1.5	0.9
Santos (SP)	22.1	4.3	1.3

KEY: SP = São Paulo; PR = State of Parana.

SOURCE: Carlini and colleagues (1990).

TABLE 2. *Lifetime prevalence of solvent, marijuana, and cocaine use among secondary students at private schools in four Brazilian cities, 1989.*

City	Percentage of users		
	Solvents	Marijuana	Cocaine
Brasília	23.5	4.3	1.3
Curitiba	16.2	4.0	0.7
Fortaleza	18.1	2.0	0.4
São Paulo	24.5	6.3	1.9

SOURCE: Carlini and colleagues (1990).

use becomes more intense among the youngest students—aged 9 to 11—and less frequent with age. This finding suggests that, in Brazil, inhalant consumption tends to be particularly intense in the preadolescent phase and usually subsides as the subjects grow older. This trend also has been identified in other countries (Fishbume et al. 1980; Oetting et al. 1988).

Inhalant use among students seems to be associated with low academic performance and to those who report one or both parents as heavy drinkers (table 5). Again, such results are consistent with those for other countries (Barnes 1979; Cohen 1977; Oetting et al. 1988; Watson 1980).

Another finding merits attention: the fact that early admission to the workforce on the part of young students—a widespread practice among lower income Brazilian families—was shown to be positively associated with inhalant abuse (table 5). As seen in table 5, 51.5 percent of the students holding jobs were classified as users, whereas among the nonusers only 32.6 percent of the students held jobs. This aspect should be the subject of further investigation, since it clashes with the commonly held belief that participation in productive activities is a protective factor

TABLE 3. *Lifetime prevalence of solvent use among male and female students in 10 Brazilian State capitals, 1989.*

City	Percentage of users	
	Male	Female
Belém	19.4	10.9*
Belo Horizonte	28.0	27.2
Brasília	21.5	10.5*
Curitiba	15.7	11.2*
Fortaleza	16.1	11.9*
Porto Alegre	14.8	11.3
Recife	25.4	16.0*
Rio de Janeiro	21.4	16.4*
Salvador	21.8	15.1*
São Paulo	26.3	19.0*

KEY: * p 0.05, chi-square test.

SOURCE: Carlini and colleagues (1990).

against drug abuse (Carlini-Cotrim and Carvalho 1993). Some possible explanations of the greater prevalence of drug use among employed students could be associated with factors such as financial independence, loose parental control over youngsters' time and behavior, and maybe even a reaction to the stressful working conditions faced by most young lower income workers in Brazil. Again, the need for further research on the subject becomes apparent.

INHALANT ABUSE AMONG STREET CHILDREN

Inhalant abuse among Brazilian students requires attention on the part of health policymakers. Furthermore, inhalant abuse among Brazilian street

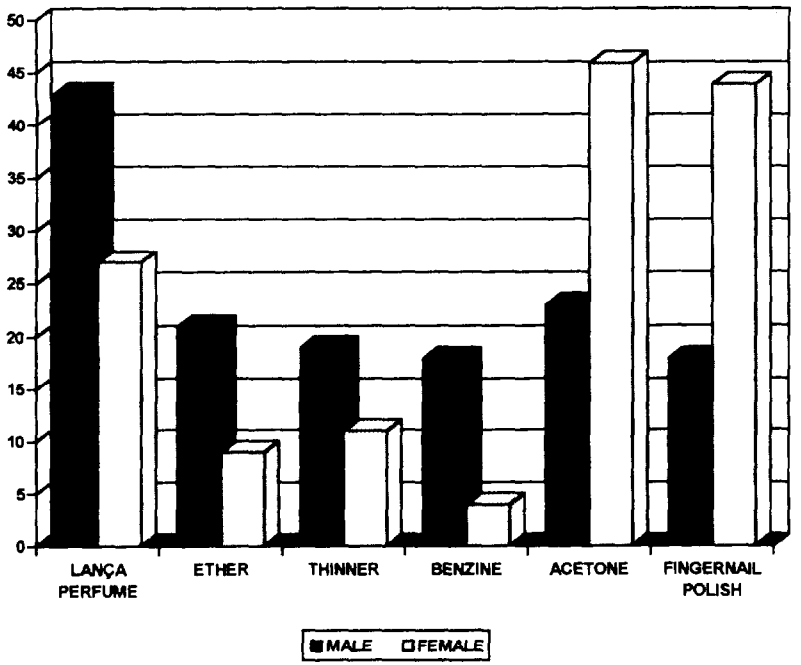

FIGURE 1. *Percentage of users of products containing solvents among male and female subjects.*

SOURCE: Carlini-Cotrim and Carlini (1988*a*).

children seems to be such a widespread phenomenon that it is virtually impossible to discuss one issue without touching upon the other. In most of the published news stories about street children in Brazil, the subjects are depicted in photographs either in the act of carrying or breathing from a plastic bag containing shoemaker's glue or in the act of committing petty theft. The same picture seems to turn up rather frequently in international media coverage of the problem.

Consequently, a brief discussion on the matter is needed prior to presenting the epidemiologic data regarding solvent use among this population. Who are these street children, and how many of them can be found in Brazil?

Brazil is a country where educational opportunities are scarce. Additionally, it is a country that has a substantial contingent of children from extremely poor backgrounds, for whom the streets constitute an

TABLE 4. *Solvent use found for 1,836 students according to age (percentage).*

Classification:	Total	Age (years) 9-11 (n = 406)	12-14 (n = 551)	15-17 (n = 574)	(n = 287)
Past users	18.5	13.8	17.1	19.7	25.1
Recent users	4.9	7.4	3.8	5.0	3.1
Users (total)	23.4	21.2	20.9	24.7	28.2

SOURCE: Carlini-Cotrim and Carlini (1988*a*).

important daily place of reference (Rosemberg 1990). This population can be divided roughly into three major groups:

1. Lower income children or adolescents who live with their families, attend school (about 4 hours per day), and spend the remainder of the day in the streets;

2. Lower income children or adolescents who live with their families but have dropped out of school and consequently spend the whole day on the streets; and

3. Lower income children who have been abandoned by their families or who have left their homes due to mistreatment or abuse and consequently live full time on the streets. These children have few, if any, family ties or institutional connections.

When children from any of these groups are on the street, their main activities include informal services, such as shining shoes, looking after parked cars, selling an assortment of small merchandise, as well as begging, and petty thefts (Carlini-Cotrim and Carlini 1988*b*; Forster et al. 1992; Silva-Filho et al. 1990). It must be stressed, however, that the intensity of the subjects' involvement with each of these activities varies

TABLE 5. *Solvent use among 1,836 students according to school achievement, employment, and drinking patterns of relatives (percentage).*

Student condition	Situation	Nonusers (n = 1,407)	Users (n = 249)
Academic performance	No delay	29.3	21.5
	1-2 grades below	41.0	41.3
	3 grades below	29.7	37.2*
Relative "drinking too much"	Father and/or mother	13.8	26.1*
	Brothers	3.6	7.4*
	Other	24.6	28.4
Employment	Yes	32.6	51.5*
	No	61.8	41.9*

KEY: * Differs significantly from nonuser group ($p \leq 0.02$).

SOURCE: Carlini-Cotrim and Carlini (1988*a*).

according to the kind of relationship maintained with their families, school, and the street environment itself. As would be expected, boys and girls lacking any family ties tend to beg and rob much more frequently than their peers who still hold those attachments. On the other hand, the latter are the ones most likely to be employed in odd jobs and services (Forster et al. 1992). Additionally, the three groups mentioned presented marked differences regarding their involvement in drug abuse behavior (Forster et al. 1992). This point will be discussed in greater detail later.

Unfortunately, differentiation among several groups of street children, with its social, political, and educational implications, only recently has been acknowledged by Brazilian academics. This differentiation,

however, rarely is taken into consideration in Government circles and in the mass media coverage of the problem. As a result, the prevailing trend found in Brazil is the identification of all children spending some time on the streets as "abandoned" children who rob and consume drugs all the time. This perception of street children also is held by a number of international agencies. Additionally, official figures furnished by unnamed Brazilian authorities estimate the number of street children to be 7 million. Consequently, this issue has become the subject of disproportionate alarm in certain national and international instances.

Some Brazilian demographers have made efforts to give numerical consistency to estimates of the various subpopulations of street children. Such studies have indicated that the number of abandoned children living full time on the streets is a few thousand—significantly fewer than the figures that are touted in alarmist reports (Rosemberg, personal communication, May 1993).

Available epidemiologic research findings point consistently to a high rate of inhalant and other drug use in this population (Bucher et al. 1991; Carlini-Cotrim and Carlini 1988*b*; Forster et al. 1992; Silva-Filho et al. 1990). Shoemaker's glue is the preferred substance among these children, followed by lança-perfume, fingernail polish, and acetone (Carlini-Cotrim and Carlini 1988*b*).

Such high rates of use, as has been noted, are markedly different depending on the kind of family ties maintained by these children, their relationship with their schools, and the part played by street experiences in their lives. Table 6 shows the lifetime prevalence rates found for solvents, marijuana, and cocaine among children living full time on the streets in two large Brazilian cities: São Paulo and Porto Alegre. Drug abuse, particularly inhalant use, is a widespread practice in this population.

Not only is this use widespread, but it is intense as well. A large portion of the subjects reported frequent use, consuming the drug at least once a week (table 7).

The results for Porto Alegre suggest that drug use behavior varies widely among the three subpopulations. Children who still have family ties report lower drug use rates than their peers who live full time on the streets. Among children who live with their families, those who attend school report no drug use, and those who did not attend school abused

TABLE 6. *Lifetime prevalence of solvent, marijuana, and cocaine use among street children living on the streets in São Paulo and Porto Alegre.*

Substance	Percentage of users	
	São Paulo (1988) (Ages 6-17) (n = 120)	Porto Alegre (1992) (Ages 7-17) (n = 34)
Solvents	77.5	71.0
Marijuana	60.0	53.0
Cocaine	15.8	12.0

SOURCES: São Paulo data: Carlini-Cotrim and Carlini (1988*b*); Porto Alegre data: Forster and colleagues (1992).

drugs (table 8). Such findings are consistent with previously mentioned results regarding the different degrees of involvement with begging, theft, and informal employment found in these subpopulations (Forster et al. 1992).

Finally, drug abuse behavior varied among children living full time on the streets depending on their involvement with specialized institutions that offer alternative daytime occupations. Figures found for São Paulo compare two subgroups of street children who lived on the streets in 1986. The first group voluntarily engaged in activities such as craft training, sports, or literacy programs held in these specialized institutions while the second group did not take part in any kind of voluntary institutional activity. Drug use and inhalant use rates were much lower in the first group. This group also was less involved in illegal activities (table 9). Unfortunately, the opportunity to participate in this type of institution is not widely available in large Brazilian cities.

TABLE 7. *Weekly use (at least once a week) of solvents among street children living on the streets in São Paulo and Porto Alegre.*

	Percentage of users	
	São Paulo (1988) (Ages 6-17) (n = 120)	Porto Alegre (1992) (Ages 7-17) (n = 34)
Weekly use of solvents	47.8	50.0

SOURCES: São Paulo data: Carlini-Cotrim and Carlini (1988*b)*; Porto Alegre data: Forster and colleagues (1992).

FINAL COMMENTS

The information that has been presented, though it is based on incomplete and sometimes dated information, points unequivocally to the fact that inhalant abuse must become a priority for Brazilian drug prevention and educational policymakers—especially dealing with the younger segments of the population. Special policies regarding alcohol and tobacco, which also constitute major public health problems in most Western countries, also should be considered.

More research is needed to support preventive and legislative action on the matter. At least four major lines of investigation should be considered in the near future: (1) epidemiologic characterization of inhalant use among other population groups, such as working-class adults, children and adolescents living in rural areas, and housewives; (2) characterization of the student population regarding beliefs and knowledge associated with inhalant use; (3) study of the roles played by family and school among lower income children as protectors from drug abuse situations and the children's eventual relationship with other institutions (e.g., religious, community-related, or others that possibly

TABLE 8. *Characteristics regarding age, gender, and drug use among Porto Alegre street children from three different subpopulations.*

	SF (n = 38)	F (n = 28)	St (n = 34)
Age (years)	7-16	6-19	7-17
Gender (%)			
Male	90	82	100
Female	10	18	0
Lifetime prevalence (%)			
Inhalants	0	25	71
Marijuana	0	11	53
Cocaine	0	0	12
Weekly prevalence (%)			
Inhalants	0	11	50
Marijuana	0	4	18
Cocaine	0	0	0

KEY: SF: Living with their families and attending school;
F: Living with their families but not attending school;
St: Living full time on the streets.

SOURCE: Forster and colleagues (1992).

could offer alternatives for the time spent on the streets by children with family ties); and (4) experimental and quasi-experimental research aimed at a better understanding of the part played by supporting institutions that work with children who live full time on the streets, in terms of their preventive role when it comes to inhalant abuse and other forms of antisocial behavior.

TABLE 9. *Use of drugs and other forms of behavior among children living full time on the streets in São Paulo, according to voluntary attendance to activities offered by supporting institutions.*

Activities	Attendance		
	Yes (n = 21)	No (n = 99)	Total (n = 120)
Daily use of solvents	4.8*	37.4	31.7
Use of any drug within the previous 30 days	47.6”	74.7	70.0
Thefts	19.0*	54.5	48.3
Begging	28.6	20.2	21.7

KEY: * Differs significantly from the children not attending voluntary institutional activities during the daytime period ($p \leq 0.02$, chi-square test).

SOURCE: Carlini-Cotrim and Carlini (1988*b*).

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Use of Inhalants in Colombia

Luis F. Duque, Edgar Rodríguez, and Jaime Huertas

INTRODUCTION

The purpose of this chapter is to provide information on the prevalence of inhalant use and abuse in Colombia. The information on the problem of inhalant abuse in Colombia presented in this chapter is based upon data collected from the 1992 Colombian National Household Survey on Drug Abuse. These survey results are derived from data collected from a randomly selected sample of 10,112 individuals ages 12 to 59 not living in institutions. All urban and rural areas of the country except for the national territories, which represent 2 percent of the Colombian population, were included in this household survey.

BACKGROUND

Little is known about the problem of drug use in the general population in Colombia. It was not until the second National Household Survey on Drug Abuse conducted in 1992 that data on the problem of inhalant abuse were found lacking. A review of the literature showed that there was only one study that collected information on the problem of inhalant abuse. A study sponsored by the Minister of Education in Colombia found that the prevalence of inhalant use among high school students was 2.4 percent, making it the fifth most widely used drug by the interviewed students (Parra 1992). More recently, preliminary results from a national survey on mental health in Colombia suggests that 0.6 persons per 1,000 between the ages of 12 and 60 had used inhalants at least once in their lives. Although other national studies or surveys such as the third National Household Survey on Health collected data on the prevalence of alcohol and other drugs, they failed to obtain information on the use of inhalants (Estupiñán 1990; Torres and Estupiñán 1991; Torres and Murelle 1987).

RESULTS

Prevalence Rates

The findings presented in figure 1 from the survey show that inhalants were the fourth most prevalent drug of abuse after alcohol, tobacco, and marijuana in the 12-month period prior to the interview.

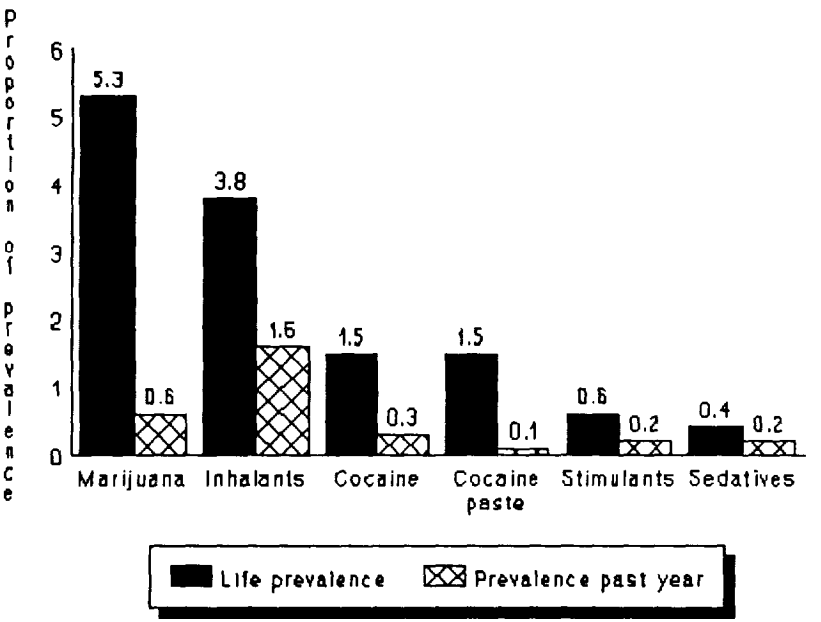

FIGURE 1. *Prevalence of use (per 100) during lifetime and during past year: Colombia, 1992.*

Overall, 3.8 percent of Colombians ages 12 to 59, or approximately 860,000 individuals, reported that they used inhalants at least once in their lives. At the same time, in the 12 months prior to the interview, 1.7 percent reported that they used inhalants, while 0.9 percent (or 195,000 individuals) indicated that they had tried inhalants during the month before their interviews. The survey results also show that those aged 12 to 17 had much higher lifetime and past-year prevalence rates of inhalant use than those aged 18 and older (table 1).

TABLE 1. *Prevalence of use of inhalants (number of persons per 100), by age, Colombia, 1992.*

Age	Preval. life	Preval. Prop. ratio +	Preval. past year	Preval. Prop ratio ++
12-17	6.6	4.2”	3.2	6.6*
18-24	5.0	3.2*	2.1	4.3”
25-44	2.7	1.7*	1.1	2.3
45-59	1.6	1 .0*	0.5	1.0

KEY: * = significant; + = chi 2 of tendency, $p < 0.0001$;
++ = chi 2 of tendency, $p < 0.000000$l.

Other results suggest that the lifetime and past-year use of inhalants was higher among nonworking individuals and among individuals with independent sources of income or who were retired than those who were unemployed, employed, or who were students. Uncharacteristically, the individuals with the lowest level of use were among people seeking employment (table 2).

Marital status was another factor found to be correlated with inhalant use among Colombians. The results as shown in table 3 suggest that those individuals who lived in common-law marriages were more likely to use inhalants than those who were formally married. Overall, the lifetime and past-year inhalant use rates were higher among common-law couples than among married individuals, singles, or separated or divorced couples.

These survey results also show that consumption of inhalants did not show significant differences based on gender. The proportion of lifetime consumption, adjusted by age, was 3.8 percent for both sexes and 1.8 percent for women and 1.5 percent for men for past-year use. Educational level, once adjusted for age, did not present major differences either, except that lower proportions are found among those who have had some amount of higher education (table 4). Chi-square tests for tendency were not significant for inhalant consumption during lifetime or during past year.

TABLE 2. *Use of inhalants by main occupation, Colombia, 1992.*

Occupation	Proportions of prevalence per 1,000 +			
	Life	Preval. prop. ratio	Past year	Preval. prop. ratio
Not working	30.6	13.9*	36.0	24.0*
Rentist/pension	41.0	18.6*	26.0	17.3*
Home occupation	9.2	4.2*	4.3	2.9*
Student	8.6	3.9*	2.1	1.4*
Worker	8.1	3.7*	3.5	1.3”
Unemployed	2.2	1.0	1.5	1.0

KEY: + = adjusted by sex and age; * = significant difference from 1.0.

Likewise, no difference in inhalant lifetime and past-year use was found in socioeconomic status when adjusted for age. The proportion of users was lower in the high stratum, although this difference was not statistically significant.

TABLE 3. *Use of inhalants by marital status, Colombia, 1992*

Marital status	Proportions of prevalence per 1,000 +			
	Life	Preval. Prop. ratio	Past year	Preval. prop. ratio
Common-law marriage	57.9	2.6*	37.0	5.4*
Separated/divorced	27.5	1.2*	18.3	2.7*
Single	25.8	1.1*	14.3	2.1*
Marriage	22.7	1.0	6.9	1.0

KEY: + = adjusted by sex and age; * = significant difference from 1.0.

TABLE 4. *Use of inhalants during lifetime: Proportion of prevalence per 1,000, Colombia, 1992.*

	Lifetime age		Past-year age	
	Nonadj	Adj by	Nonadj	Adj by
SEX				
Men	38.3	38.4	15.3	15.4
Women	37.7	38.2	17.3	18.2
EDUCATION				
Illiterate	27.5	38.8	11.6	18.2
Primary school	38.5	39.2	16.3	16.9
High school	42.5	38.4	18.8	17.0”
University	26.3	26.9	11.6	7.2*
SOCIOECONOMIC STATUS				
Low	38.8	38.3	17.3	17.1
Middle	38.2	38.6	16.6	16.8
High	32.4	33.5	12.1	12.7
URBANIZATION				
up to 2,500	42.8	39.0	17.5	17.1
2,500-99,999	39.2	33.0	20.2	20.3
100,000-499,999	28.8	24.8	10.5	12.8
500,000 or more	38.3	29.6	16.8	16.3

KEY: * = significant difference.

It was observed that lifetime and past-year inhalant use was associated with a lower level of urbanization. Those individuals living in urban areas of 2,500-100,000 inhabitants were more likely to use inhalants than individuals living in urban areas with populations over 100,000. However, no statistically significant differences were found among the levels of urbanization. When rates were adjusted for sex and region, the differences remained (table 4).

Incidence Rates

Data from the survey also provided estimates of incidence of inhalant use among Colombians. The survey results estimated the annual rate to be 65 per 10,000 person-years.

Among those between the ages of 12 and 59 years, an annual estimate is that about 144,000 people are initiated into inhalant use in Colombia.

The survey results show that age was the variable most associated with the incidence rate (record the X^2 value $p < 0.0000001$) (table 5). The age group with the highest incidence rate was the 12-17 cohort, followed by the 18-24 age group and the 25-44 age group. No data were available for the 45-59 age group.

TABLE 5. *Use of inhalants, Colombia, 1992: Estimated incidence rate per 10, 000 person-years.*

Age	Incidence rate +	Odds ratio
12-17	184	5.0**
18-24	59	1.6*
25-44	37	1 .0*

KEY: + = chi 2 of tendency, $p < 0.000000l$; * = significant difference.

Marital status also was found to be associated with initiation of inhalant use during the past year. Those who were married were found to have the lowest probability of becoming inhalant users. Once adjusted for age, the results suggest that individuals living in common-law marriages had the highest risk of using inhalants (almost nine times that of married couples). Singles have a risk close to five times that of people in common-law marriages. No significant differences were found to exist between married individuals and those who were separated or divorced. However, significant differences were found between those living together without formal marriage and those separated or divorced (table 6).

The analyses of data by gender showed that no significant differences were found between males and females. Nevertheless, the results did

TABLE 6. *Use of inhalants, Colombia, 1992: Estimated incidence rate per 10,000 person-years by marital status.*

Marital status	Incidence rate +	Odds ratio
Common-law marriage (1)	178	8.9**
Single (2)	93	4.7”
Separated/divorced (3)	34	1.7*
Married (4)	20	1 .0**

Significant differences*

	1	2	3	4
1			*	*
2				*
3				
4				

KEY: + = adjusted by age; * = significant difference.

suggest that the incidence rate among women when adjusted for age (73 per 10,000 person-years) was higher than that of men (64 per 10,000 person-years).

Other results, as shown in table 7, indicate that the incidence of the risk of inhalant abuse was found to be significantly higher among high school students than university students after age adjustments were made. The survey results also indicate that occupational level was another important variable related to the inhalant-using behavior of Colombians. The results suggest that the highest rate of incidence, adjusted for age and sex, was among those who did not work, and the lowest rates were among students and working persons. Nevertheless, as shown in table 7, none of the differences were statistically significant. Insufficient data were available for people of independent means and for retired people to draw any conclusions.

Also, as shown in table 7, socioeconomic status and level of urbanization were not found to be significantly related to incidence of inhalant abuse. The results do suggest that the risk for use was higher among low-income individuals living in large urban areas than among higher income brackets living in smaller urban areas and in other income levels.

TABLE 7. *Use of inhalants, Colombia, 1992: Estimated incidence rate per 10,000 person-years.*

	Incidence rate	Incidence rate adjusted by age	Odds ratio +
SEX			
Men	62	64	1.0
Women	68	73	1.1
EDUCATION			
Illiterate	17	29	2.4
Primary school	63	64	5.3
High school	91	82	6.8*
University	7	12	1.0*
MAIN OCCUPATION			
Not working	286	401#	8.0
Home	48	70#	1.4
Working	35	51#	1.0
Student	163	50#	1.0
SOCIOECONOMIC STATUS			
Low	74	72	2.5
Middle	64	66	2.3
High	28	29	1.0
URBANIZATION			
up to 2,500	53	54	1.0
2,500-99,999	76	68	1.3
100,000-499,999	54	62	1.1
500.000 and more	75	81	1.5

KEY: + = odds ratio, adjusted rates; * = significant difference;
= adjusted by age and sex.

Percentage of Current and New Inhalant Users

In order to address treatment and prevention needs, special analyses were performed on data for persons who were current or new inhalant users. A

current inhalant user is defined as a person who reported using inhalants during the 12 months prior to being interviewed. A new consumer is defined as an individual who used inhalants for *the first time* during the 12 months prior to the interview. The results from this survey show that there were more female than male current and new users. Individuals 18 years of age or younger were found to have the highest number of current and new users of any age category. Occupational status showed that the percentage of inhalant users was similar for students, those who were employed, and those in domestic situations. On the other hand, the survey indicated that almost half of all new users were students, followed by those who were employed and those in domestic situations.

Furthermore, the findings by economic status suggest that those in the lowest socioeconomic levels have the highest percentage of current and new users. Finally, the greatest number of current and new users were found in cities with over 500,000 inhabitants (figures 2(a) and 2(b)).

Regression analysis of the data collected revealed that age accounted for 80 percent of the variance responsible for inhalant-using behavior (table 8).

Patterns of Inhalant Abuse

Data collected from this survey measured frequency of use and age of initiation of inhalant users. Subjects in the survey were classified as "occasional" users if they had inhaled once during the past month, "moderate" if they used from two to four times, and "heavy" if they inhaled five or more times. Using this classification, it was determined that 28.1 percent of the users were "heavy" users; 34.3 percent "moderate" users, and 35.7 percent "occasional" users (table 9).

The average age for initiating inhalant abuse was 16.8 years of age with no significant difference between males and females. Analysis of the data regarding age of initiation to inhalant use suggests that among current users there has been a decrease in the age of initiation from those who started use at the preadolescent, adolescent, and early adulthood years. This tendency was statistically significant for those current users who initiated use between the ages of 12-17. Among previous inhalant users there also was a slight reduction in the age of initiation, but only for those who started their use after the age of 12. This reduction was statistically significant for those previous inhalant users who started use between the ages of 12-17 (see tables 10(a) and 10(b)).

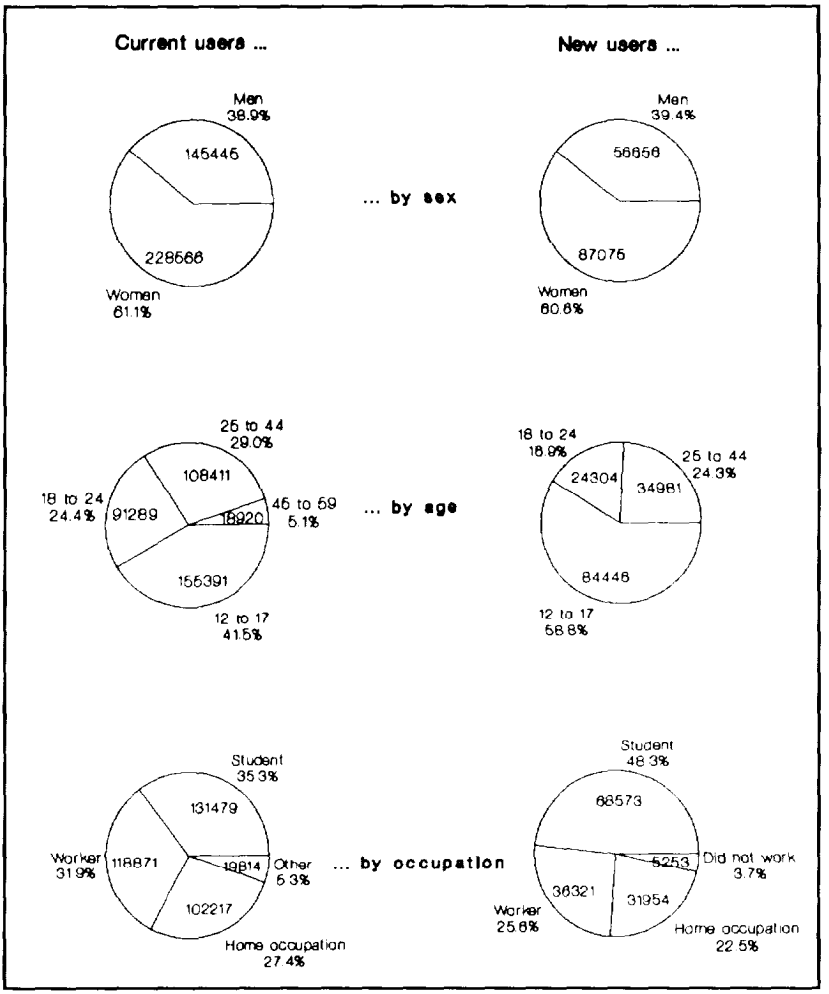

FIGURE 2(a). *Proportion and number of inhalant current users and new users: Colombia, 1992.*

Other results suggest that the mean age of initial inhalant use among high-income current users was lower than that of the middle and lower income inhalant users: 13.8 years, 17.1 years, and 17 years of age, respectively. It should be noted that these age differences were found to be statistically significant at $p < 0.0004$. In addition, those living in cities with populations of 100 to 500,000 inhabitants initiated inhalant use at an earlier age than users living in smaller towns or larger metropolitan areas. This age difference was found to be statistically significant at the $p < 0.000001$ (table 11).

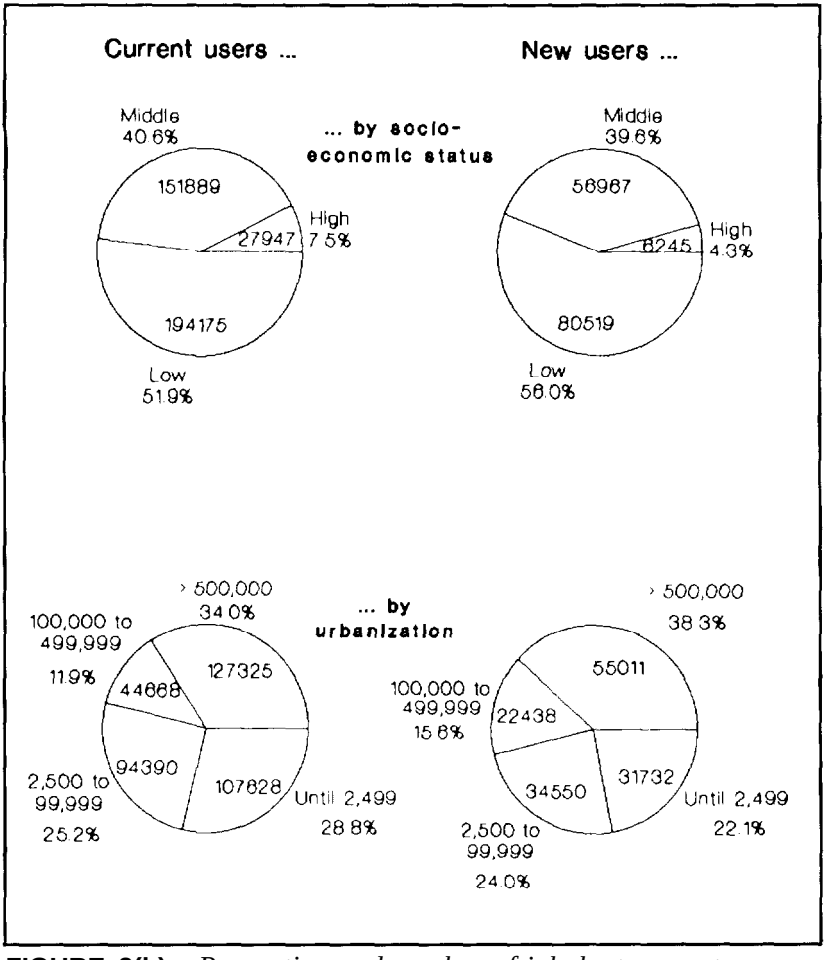

FIGURE 2(b). *Proportion and number of inhalant current users and new users: Colombia, 1992 (continued).*

The survey results also provided information on the duration of use among former users (i.e., persons who reported "ever" using who did not report use in the 12-month period prior to interview). Among male users, this period lasted an average of 6.6 years and a mean of 5.5 years for females. Users living in smaller towns also had longer mean periods of inhalant use, as did individuals with higher income levels (table 12).

Data also were collected on efforts made by individuals to stop inhalant use. Overall, 53 percent of inhalant users stated that they had attempted to stop their use. These attempt rates were higher among those who were unemployed (72.9 percent) and among students (60.6 percent). On the

TABLE 8. *Regression analysis: Use of inhalants during past year, Colombia, 1992.*

Variable	B	df	Signif	Exp (B)
AGE		3	.0002	
12-17	.7259	1	.0000	2.0665
18-24	.2551	1	.1641	1.2906
25-44	-.0272	1	.8905	.9732
USE ILLEGAL PSYCHO SUBSTANCES	-.8735	1	.0197	.4175
OPINION HEALTH CONSEQUENCES		4	.0000	
Not harmful	.7242	1	.1568	2.0631
Light	.2804	1	.4433	1.3236
Very harmful	-.8218	1	.0121	.4396
Don't know	-.9736	1	.0152	.3777
OPINION PROBLEMS JUSTICE/POLICE		3	.0011	
No problems	.3128	1	.0907	1.3673
Light problem	.1785	1	.2986	1.1954
Serious problem	-.5584	1	.000l	.5721

Overall 81.25%
No other variables were added to the model

	Chi 2	d f	Significance
-2 Log likelihood	771.251	852	.9775
Model chi-square	93.999	11	.0000

TABLE 9. *Frequency of inhalant use during past month: Percentage, Colombia, 1992.*

	Occasional %	Moderate %	Heavy %
SEX			
Men	39.1	41.3	17.2
Women	33.8	30.2	34.5
AGE			
12-17	41.1	37.0	19.7
18-24	37.6	26.4	31.6
25-44	33.2	37.3	29.5
45-59	15.4	32.1	52.5
EDUCATION			
Illiterate	10.5	.0	77.2
Primary school	43.2	38.5	16.0
High school	35.5	29.8	34.7
University	25.1	74.9	0.0
MAIN OCCUPATION			
Worker	25.8	48.7	22.5
Not working	.0	.0	100.0
Looking for work	36.7	63.3	0.0
Student	42.4	32.7	22.4
Home	40.6	19.0	40.4
MARITAL STATUS			
Married	33.1	25.4	41.5
Single	34.1	41.9	20.6
Separated/divorced	36. 1	27.5	36.4
Not formal marriage	40.2	23.9	35.9
URBANIZATION			
Up to 2,500	23.6	41.9	30.5
2,500-99,999	35.1	24.2	40.7
100,000-499,999	22.1	40.7	31.1
500,000 and more	50.5	33.7	15.8
SOCIOECONOMIC STATUS			
Low	47.6	26.8	21.5
Middle	21.4	45.6	33.0
High	43.6	19.7	36.7

TABLE 10(a). *Mean age at first inhalant use, by current consumer's age, Colombia, 1992.*

	Current Age		
	12-17	18-24	25-60
Age at first inhalant use	Mean	Mean	Mean
< 12	9.1	8.7	8.4
12-17	13.6*	14.8*	13.9
18-24		20.7	19.7
25-44			31.5
Total	12.0	15.1	23.8

KEY: * $p < 0.04$.

TABLE 10(b). *Mean age of initiation of inhalant use, by former user's age, Colombia, 1992.*

	Current Age		
	12-17	18-24	25-60
Age at first inhalant use	Mean	Mean	Mean
< 12	8.7	8.8	8.6
12-17	13.6*	14.3*	14.8
18-24		19.2	20.2
25-44			31.3
Total	10.5	12.8	17.1

KEY: * $p < 0.04$.

TABLE 11. *Mean age at first inhalant use among current users, Colombia, 1992.*

SOCIOECONOMIC STATUS	
Low	17.0#
Middle	17.1*
High	13.8*#
URBANIZATION	
Up to 2,500	15.8
2,500-99,999	17.4*
100,000-499,999	14.7*#
500,000 and more	18.0'

KEY: * and # = significant differences.

other hand, the percentage of individuals over 45 years of age or of high-income means who attempted to quit was low. None of those over the age 45 reported any efforts to quit, and only 40.4 percent of high-income individuals reported efforts to stop their inhalant use (see table 13). The analysis of the data showed that approximately 55 percent of those who attempted to quit the inhalant use succeeded in their efforts.

TABLE 12. *Length of inhalant use (in years) among former consumers, Colombia, 1992.*

SEX	
Men	6.6
Women	5.5
SOCIOECONOMIC STATUS	
Low	6.1
Middle	5.6
High	7.9
URBANIZATION	
Up to 2,500	7.6
2,500-99,999	5.3
100,000-499,999	6.5
500,000 and more	4.6

TABLE 13. *Percentage of current consumers who had tried to quit the use of inhalants, Colombia, 1992.*

	%
SEX	
Men	58.2
Women	49.8
AGE	
12-17	59.4
18-24	49.4
25-44	56.4
45-59	0.0
EDUCATION	
Illiterate	48.2
Primary school	53.0
High school	58.2
University	21.0
MAIN OCCUPATION	
Worker	47.3
Not working	72.9
Looking for work	36.7
Student	60.6
Home	49.7
MARITAL STATUS	
Married	43.7
Single	54.6
Separated/divorced	55.6
Not formally married	54.1
URBANIZATION	
Up to 2,500	49.3
2,500-99,999	56.1
100,000-499,999	39.9
500,000 and more	58.6
SOCIOECONOMIC STATUS	
Low	56.3
Middle	51.3
High	40.4

Consequences of Inhalant Use: Perceived Risk

The perceived risk of inhalant use as very harmful among those who have never used inhalants, former users, and current users is 82.9 percent, 73.3 percent, and 64.7 percent, respectively, as shown on figure 3. Furthermore, of the subjects interviewed, 58.4 percent of those who were nonusers reported that inhalant use may cause serious problems with police or justice, whereas 45.3 of former users, and 39.0 percent of current users had the same perception (figure 4). These results suggest that those who are current inhalant users are less concerned about the consequences of this use than former or nonusers. The findings also show that there is a high level of consciousness among Colombians regarding the damaging effects of inhalant use.

Despite this consciousness, there continues to be a significant number of people who pay little attention to the harmful consequences of inhalant use. Data from the household survey indicate that 24.6 percent of females of childbearing age reported increasing their inhalant consumption during the late stages of pregnancy, while 34.4 percent maintained the same level of use. Only 26.5 percent reduced their inhalant use during pregnancy.

These findings are alarming. They indicate that inhalants were the only drugs that showed an increase in use during pregnancy. Additionally, the data show that the rate of cessation of inhalant use among women during pregnancy was much lower that those reported for other drug categories. For coca paste and marijuana, the cessation rates exceeded 84 percent and, for cocaine, alcohol, and cigarette smoking, the cessation rates were over 50 percent.

SUMMARY AND CONCLUSION

This is the first report on use of inhalants based on a nationwide study in Colombia. Two previous studies with psychotropic substance use did not analyze inhalant use.

Both the National High School Survey on Drug Abuse and the National Survey on Mental Health in the Colombia population reported lower prevalence rates of inhalant use than the rates reported by the National Household Survey on Drug Abuse (Parra 1992; Torres et al. 1994).

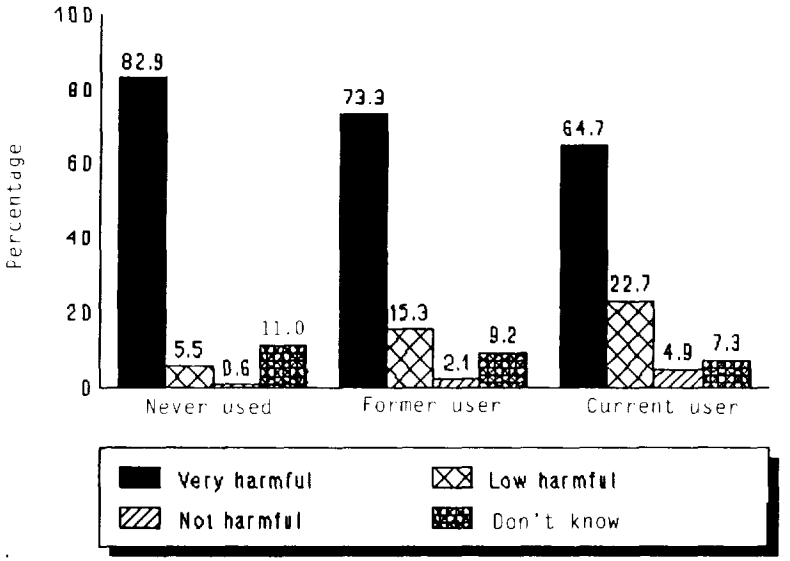

FIGURE 3. *Opinion on health consequences of inhalant users: Colombia, 1992.*

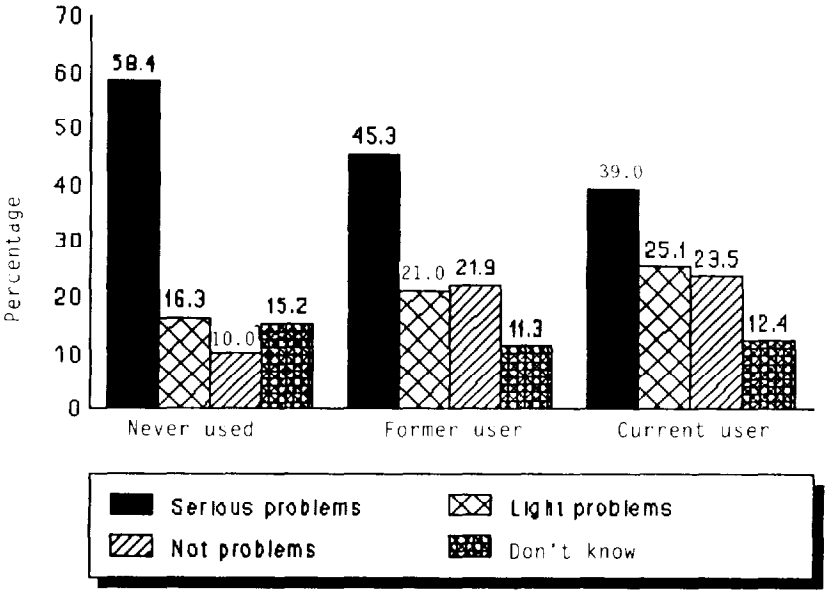

FIGURE 4. *Opinion on problems with justice/police associated with inhalant use: Colombia, 1992.*

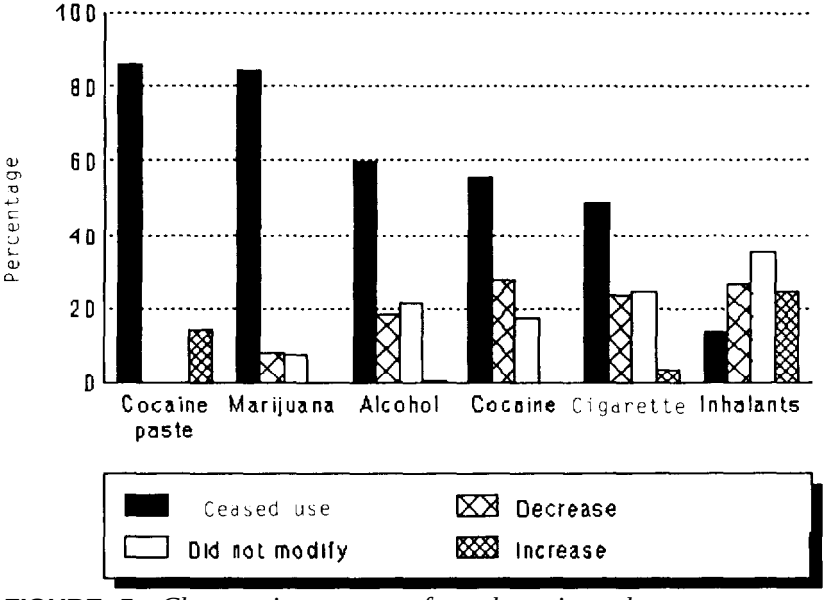

FIGURE 5. *Changes in patterns of psychoactive substances use during past pregnancy: Colombia, 1992.*

Prevalence of inhalants during the past year (1.7 percent) is one of the highest prevalences in Colombia, surpassed only by alcohol and tobacco. Lifetime prevalence is the fourth (3.8 percent), after alcohol, tobacco and marijuana. The estimated incidence rate is 65 per 10,000 person-years. This means that every year about 144,000 persons initiated inhalant use in the country, most of them adolescents.

Age is the variable most associated with inhalant use, with adolescents 12-17 years of age reporting the highest rates of use. Other variables having a statistically significant association to the prevalence of inhalant use were marital status and occupational status. These two variables seem to be related to inhalant use because they are associated with the subjects' age. On the other hand, no characteristics were found associated with cessation of inhalant use.

The largest numbers of current and new inhalant users were found among adolescents, women, students, individuals of low socioeconomic status, and persons living in large cities (i.e., those with greater than 500,000 inhabitants). Prevention programs need to focus on these groups.

The conduct of consumers of inhalants who become pregnant is alarming, since the majority continued consumption during gestation, and a high percentage (24.6 percent) even increased use.

However, it is important to point out that there are a number of limitations in this study that may affect the results reported. Most importantly, this survey does not include children younger than 12 or children living in the streets in urban or rural areas. As previous studies on inhalant use had showed, the highest prevalence of inhalant use is among street children. For example, a recent study on the drug-using behavior of children living in the streets found inhalants to be the preferred drug of the youth interviewed (Knaul and Castillo, in press; Lozano 1990).

Additional research that would explore those factors that expose or protect individuals from the use of inhalants is needed. Particularly, ethnographic studies that focus on collecting data on children living in the streets, as well as studies of pregnant women who use inhalants, are most needed. The results from these ethnographic studies then could be utilized to develop longitudinal and case control studies that will explore this issue in more depth. Finally, research that evaluates the effectiveness of prevention education programs also is needed. This development of information on inhalant abuse is an integral part of the Colombian Government's efforts to deal with the drug problem in that country. This effort should involve creating a strategy that deals with drug use, not only as a law enforcement problem but as a public health problem that requires the development of data sources that could be utilized to develop more effective drug prevention and treatment programs (Dirección National de Estupefacientes 1993).

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Inhalant Abuse: A Hungarian Review

Eva Katona

A major objective of this chapter is to draw attention to the need for more scientific research on drug epidemiology—especially on volatile substance abuse—in order to obtain a better understanding of the issue and, consequently, to set up prevention and intervention programs. This chapter first introduces the drug scene in Hungary, then reviews Hungarian research in the field, and finally presents available data on inhalant abuse patterns and trends and the psychosocial background and characteristics of inhalant abusers, focusing on local-regional variability.

THE DRUG SCENE IN HUNGARY

Hungary lacks reliable epidemiologic data on drug abuse in general because of the scarcity of trained professionals and limited resources. Moreover, confusion in the field arises due to differing use of concepts, the conflicting interests that influence the acquisition of data, and the lack of proper collection and processing of data (Forgacs and Katona 1990). Based on statistics from police, criminal records, drug traffic statistics, and the health care system, there are an estimated 20,000-30,000 drug users out of a total national population of 10,310,179 (Central Office of Statistics 1992). Hard core drugs (e.g., heroin and cocaine) are not yet widespread, although Hungary is now in a transition phase and might experience an explosive increase in drug-related problems because of a more liberal foreign policy, tourism, and growing demand. Due to Hungary's geographic location, the country has become a transit site between East and West, from the drug producer to the drug consumer. This condition is exacerbated by the Yugoslavian civil war, as the so-called Balkan Route of drug trafficking from the Middle East and Turkey to the Western European countries crosses Hungary to avoid Yugoslavia. An organized drug market exists, and there has been a growing supply of drugs, evidenced from the quantity seized year by year (Interministerial Drug Committee 1992).

The most common and frequent drugs of abuse are prescription drugs, mainly codeine, tranquilizers, sedatives, and hypnotics, and they almost

always are combined with alcohol. Alcohol is the most abused legal drug in Hungary. Beside prescription drugs, youngsters use poppy tea or homemade preparations of poppy straw, mainly administered intravenously. The age of drug abusers ranges from 18 to 30 years.

From the middle to late 1960s, glue was the most commonly abused substance among youngsters (Cseme 1991; Farkasinszky et al. 1976; Forgacs 1990; Racz 1992). The first drug-related deaths and police cases were reported in 1969 (Levai 1991). Volatile substances were easily accessible, although several products were withdrawn from the market because of either overdose or sudden deaths occurring among adolescents following their use.

By 1990, within a 10-year-period, 55 drug-related deaths due to volatile substance abuse were registered.

By the end of the 1970s, young people became addicted to polydrugs, including glue, prescription drugs, and alcohol; this continues even today (Gryneusz and Pressing 1986). There always are new prescription drugs being discovered by abusers for their narcotic effects. In the 1970s, a specific antiparkinsonian prescription drug, trihexyphenidyl hydrochloride, was abused and consequently taken off the market because of its hallucinogenic effects (Kisszekelyi 1973). Today's most popular hypnotic prescription drug is glutethimide, which has severe withdrawal effects when abused.

Since the 1980s, homemade preparations of poppy straw have become very popular along with stimulants, and the trend of abuse certainly is on the rise. Meanwhile, volatile substance abuse has decreased, almost vanishing in certain areas, while in other regions it has been maintained.

HUNGARIAN RESEARCH ON DRUGS

While the drug problem was noticed in the early 1970s in Hungary, it took a long time for policymakers to support research to better understand the nature of deviant behaviors and social maladaptation (Andorka 1985). A few studies were conducted on a sporadic basis at that time. These studies were descriptive in nature and were based on clinical observation. These few descriptive studies showed that a problem existed, but the information was limited and could not lead to a deep understanding of why and how inhalant abuse emerged and spread and who got involved.

The lack of epidemiologic research and expertise on treatment and public awareness of the hazards of glue sniffing and other solvent abuse and the ignorance of the governing political power led to widespread substance-abusing behavior by the end of the 1970s. A group of scientists attempted to draw the attention of the Government to socially deviant behaviors such as suicide, delinquency, substance abuse, and mental disturbances, but there was a minimal response taken to prevent such behaviors. In this way, Hungary delayed facing these social problems for at least 15 years. Such problems first were criminalized and later medicalized. Medical doctors, psychiatrists and psychologists, and sociologists were pioneers in dealing with these clients, counteracting the traditions, the rules, and the law. This is why there currently are only a limited number of experts, epidemiologists, and other researchers in the drug field. Not only were epidemiologic studies not performed, but neither was there research conducted in treatment outcome. Very little attention has been paid to the legal side of the abuse of volatile substances. It is noticeable that data collection is fairly incomplete in the drug field, not only for the health care system but also for other nongovernmental agency contacts, such as the various churches (Forgacs and Katona 1990).

The retrospective studies, conducted mainly by clinicians, are based on their observations, which do not always meet international requirements for research on drug abuse. In this chapter, various examples of episodic and local-regional patterns and trends of volatile abuse in Hungary will be presented. The studies were conducted using different methodologies, demonstrating that no common concept or perception of the problem or reliable measurement exists, potentially leading to misinterpretation of the problem. These studies were conducted at different periods in time and at different sites. They were conducted during the 1970s and 1980s, and several are very recent. The studies were conducted in four different cities representing two cultural-traditional-religious backgrounds rooted in the Middle Ages, when the country was conquered by the Turks (the Ottoman Empire) and the Habsburgs (the Austro-Hungarian Empire), and this way it was divided into two separate parts. This historical background may partly explain why the findings are so different at various locations, concerning not only inhalant abuse but other deviant behaviors such as alcoholism, suicide, and delinquency. The data are not generalizable because the criteria of examination and observation varies from investigator to investigator. Data on the general population based on household surveys are not available.

GENERAL STUDIES

Kisszekelyi (1980) examined 25 inhalant users (12 males, 13 females) in 1973 at the request of the municipality. Their average age was 14 years; three were employed, while the rest were enrolled in school. Other studies reported on two to three groups consisting of between 25 and 50 youths in 1976 and 1977 that explored the social background and lifestyle of inhalant users. They found that most of the subjects were in elementary school, that males were more represented in their sample, that their parents were mainly laborers, and that a great many of the subjects came from broken homes (Farkasinszky 1976; Kisszekelyi 1973). One followup study showed that, out of one group of 48 students, 30 did not continue their school studies after age 14 (this was the mandatory age limit for school attendance at that time) (Lakne 1976).

Out of 50 inhalant abusers, Farkasinszky found that 22 had dysharmonic personalities and that solitary users were latent depressive (Farkasinszky 1976). In a later study of 476 treated substance abusers from the Mental Health Center for Adolescents in Szeged, Farkasinszky (1987) found that 9 had died (1.9 percent)—half of them having committed suicide. Twenty-nine percent had at least one previous suicide attempt, and 30 percent had been hospitalized mainly for detoxification.

Farkas (1981) examined the annual reports substance abusers made to the health care system between 1976 and 1981 (figure 1). In 1976, 98 cases were reported; in 1977, 215; in 1978, 97; in 1979, 81; in 1980, 870; and in the first half of 1981, 700. This number increased to 3,125 in 1991, 200 cases more than in the previous year.

Racz (1985) conducted a long-term survey on subcultures, analyzing peer involvement, the group identification process, sociometry, and members' substance use characteristics. This was a pioneering effort to understand the "peer phenomenon" in a specific subculture and its impact on drug abuse.

Zsuzsa Elekes, a sociologist, conducted a well-designed survey in 1991 on different groups of substance abusers and tried to provide an overall view of the drug problem (Elekes 1991). She selected 4 groups, each of them consisting of 30 drug abusers: inmates in a prison for juvenile delinquents; residents of a special education institution for problem youth; problem youth in the Pentecostal Church; and a group selected by the snowball method. The following characteristics of these 120 drug

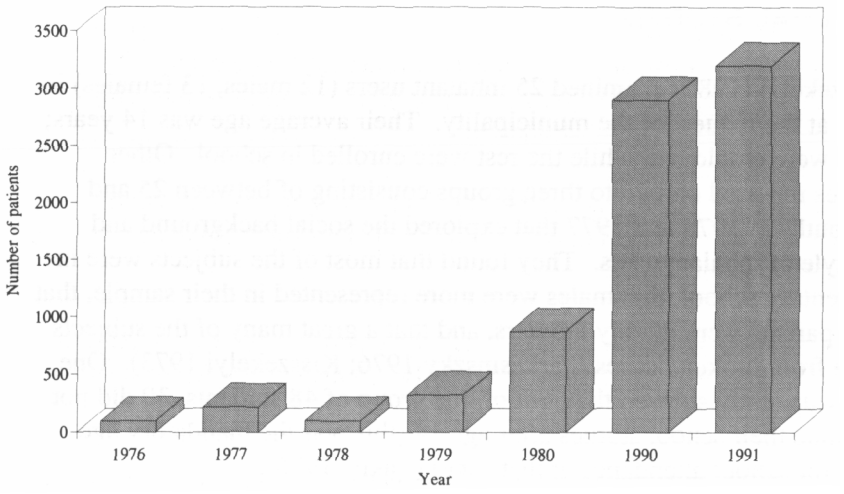

FIGURE 1. *Substance abusers treated in the health care system from 1976 to 1991 in Hungary.*

SOURCE: National Institute for Psychiatry and Neurology, Budapest, Hungary (unpublished data, 1992).

abusers were examined: demographic and social background, childhood and transition to adulthood, social contacts, drugs of primary abuse, other deviant behaviors among the abusers, leisure-time activity, and religiosity. The four investigated groups were different, but no special drug subculture was found.

The investigator assigned the 120 subjects to 1 of 7 groups according to the preferred drug, defined as the drug used for the longest period of time. The instrument of investigation was a 3-hour structured interview focusing on the themes mentioned above. The following groups were formed:

1. *Opiate abusers:* Ten people abused this drug for at least 1-2 years (9 males, 1 female; average age, 20 years; 1 person's first choice of drugs was a volatile substance; 7 started with opiates, 2 with marijuana).

2. *Cannabis abusers:* Seventeen persons consumed either marijuana or hashish weekly or daily for at least a year (10 males, 7 females; average age, 22.3 years; 10 started with marijuana, one with opiates, and 3 with inhalants).

3. *Prescription drug abusers:* Sixteen persons with at least 2 years of prescription drug abuse (11 males, 5 females; average age, 20.5 years; 8 individuals started with medicine, 5 with inhalants, and 1 each with opiates and stimulants).

4. The fourth group was composed of inhalant abusers and was divided into three subgroups depending on the length and frequency of abuse of inhalants:

   (a) *Short-term frequent use:* These persons exhibited a maximum of 2 years of abuse, almost daily (23 males, 4 females; average age, 17.9 years).

   (b) *Long-term frequent use:* These persons exhibited a minimum of 2 years of abuse of inhalants more times per week, and 12 exhibited daily use (22 males, 0 females; average age, 21.3 years).

   (c) *Seldom use:* These persons exhibited use once a week, between 1 and 2 years (9 males, 12 females; average age, 15.9 years).

5. *Casual abusers of inhalants:* This group included 7 individuals who had never abused any drug on a regular basis (5 males, 2 females; average age, 18 years; preferred drug: 4 used inhalants, 2 used cannabis, and 1 used prescription drugs).

Of the 120 subjects, 70 were primarily inhalant abusers, 67 started their drug career with inhalants, 2 with prescription drugs, and 1 with opiates.

Out of 117 drug users, 68 percent first tried inhalants, 12 percent began with cannabis, 9 percent first used opiates, 9 percent began with prescription drugs, and 2 percent first tried hallucinogens (figure 2). A greater number of inhalant abusers belonged to the "prison group," which consisted of males only and individuals who were frequent users. The remaining information from the study was analyzed primarily by location of the group and not by the type of drugs abused. A summary of the data concerning inhalant abusers is as follows:

- Separated from mother at an average age of 11.5 years;

- Main cause of separation: imprisonment, foster care;

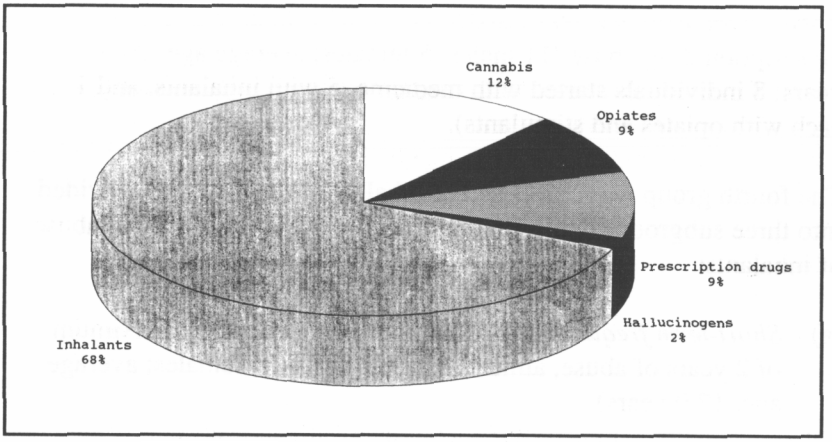

FIGURE 2. *Drug used at initiation of drug career (N = 117).*

SOURCE: Elekes (1991).

- Living with father an average of 11.9 years;
- Have an average of three to four siblings; the abuser is the first- or second-born child;
- Twenty-five percent of inhalant abusers have a deviant mother, and 25-30 percent have a deviant father (deviant is defined as suicidal, mentally ill, or alcoholic);
- School performance included frequent failure or repeated class (60 percent while in elementary school), and only 40 percent graduated from elementary school;
- Short-term frequent users (38.5 percent) were mainly unskilled workers;
- Long-term frequent users (31.4 percent) also were mainly unskilled workers or never worked;
- Seldom users (30 percent) mainly never worked;
- Have an average of at least five drug user friends;
- Had first sexual experience at age 14;

- Initiated regular drug use at age 14;
- Over 40 percent made a suicide attempt by hanging or stabbing;
- First suicide attempt at age 14 (some had several attempts);
- Precipitating cause of suicide: loss of partner, hopelessness, depression;
- Suicide attempt was not recognized or followed by psychological help;
- On average, two contacts made with the health care system (for detoxification or suicide); and
- Subjects had undergone a total of 281 arrests.

The investigator concluded that despite the nonrepresentativeness of the sample, the study showed remarkable differences among the subgroups of the drug abusers (Elekes 1991).

REGIONAL STUDIES

Data were gathered from four different sites: four counties and their largest cities, including the capital of Hungary, Budapest. The four different sites represent diverse trends and patterns of drug use even though inhabitants' psychosocial backgrounds are very similar. However, since data were collected at different periods of time using different indicators and different methodologies, it is difficult to make comparisons. For this reason, only those data items that could be compared will be presented.

BUDAPEST METROPOLITAN AREA

The first drug outpatient clinic in Budapest, with a catchment area of 3,000,000, was opened in 1987. The clinic provides data on inhalant abusers from the period of 1991 to 1993. Of the 190 registered drug abusers for this period, 23 were inhalant abusers: 20 males and 3 females.

The registered inhalant abusers ranged in age from 17 to 33 years. Ten percent lived in foster homes, and 13 percent were homeless. They varied in educational achievement, with 52 percent having finished elementary school; 13 percent, vocational school; and 7 percent, high school. Twenty-three percent had dropped out of school.

Drug use sequenced behaviors that began as follows:

1. Smoking was initiated between ages 8 and 19, at an average age of 13 years.

2. Alcohol was initiated between ages 10 and 17, at an average of age of 13 years.

3. First drunkenness occurred between ages 10 and 19, at an average age of 13 years.

4. First substance was tried between ages 13 and 20, at an average age of 16 years.

5. First intravenous use of a drug was initiated between ages 17 and 22, at an average age of 18 years.

6. Regular drug use started between ages 15 and 27, at an average age of 19 years (figure 3).

The groups used other drugs beside inhalants: prescription drugs (i.e., sedatives and stimulants), 27 percent; opiates, 22 percent; cannabis, 19 percent; alcohol, 16 percent; hallucinogens, 13 percent; and stimulants and cocaine, 3 percent (figure 4).

Thirteen percent of all clients received outpatient care for their drug abuse. Thirty-nine percent were hospitalized for various periods of time: 17 percent for a maximum of 3 days, 21 percent for up to 3 months, and 4 percent for 7 months. Special treatment was received by 17 percent, and psychological treatment was carried out with 26 percent of the subjects.

Seven individuals (33 percent) attempted suicide (totaling 18 occasions), some individuals twice, and three others attempted suicide three times. The attempts were executed by hanging, stabbing, overdose of

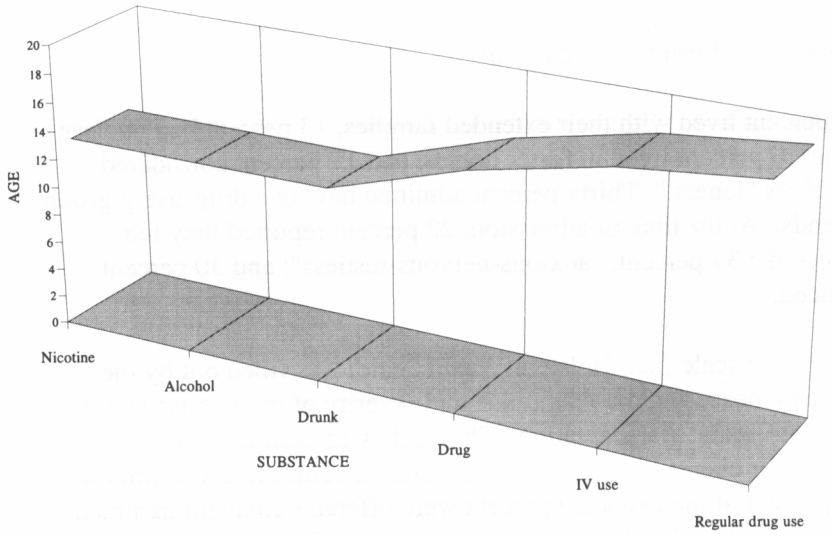

FIGURE 3. *Age at first use of substances.*

SOURCE: Budapest Drug Outpatient Clinic, Hungary (unpublished data, 1992).

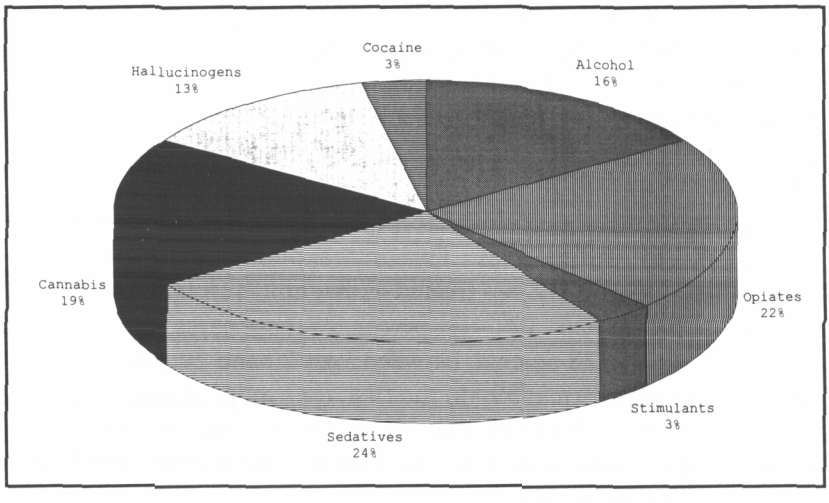

FIGURE 4. *Other drugs used beside inhalants (N = 23).*

SOURCE: Budapest Drug Outpatient Clinic, Hungary (unpublished data, 1992).

medication, and jumping from a tall building. The age range for suicide attempts varied from 15 to 24 years.

Four percent lived with their extended families, 13 percent had nuclear families, 4 percent lived in foster homes, and 17 percent considered themselves "loners." Thirty percent admitted having a drug-using group of friends. At the time of admission, 22 percent reported they felt "depressed"; 39 percent, "anxious-nervous-restless"; and 30 percent, "balanced."

An objective scale (i.e., Holstein-Waahl Scale) was filled out by the examiners measuring the magnitude and severity of drug abuse and its consequent social maladaptation. This scale was used to develop regimens for clients. Using this measurement, counseling was provided in 26 percent of the cases, 39 percent were offered outpatient treatment, and 30 percent of the clients were recommended for hospitalization.

Eighty-seven percent of the individuals had at least one alcoholic in his or her family, and 65 percent had one alcoholic parent (twice as many fathers as mothers were alcoholics). Twenty-three percent had a drug-user parent (four times more females than males), 18 percent had a depressed family member, 21 percent reported a suicide in the immediate family, and 88 percent had an alcoholic in the family (figure 5). Eighty-three percent experienced an object loss during his or her lifetime (e.g., parents' or own divorce, death of a family member, or loss of friend or job). The earliest experience of loss was at age 10.

Less information was available from a detoxification unit in Budapest, where all types of intoxication cases (except for alcohol) are admitted from the city and surrounding areas. This unit reported in 1992 that out of the total number of 10,000 cases treated at that unit, 118 inhalant intoxications were identified. Fifty-six percent of these cases were between ages 10 and 19; 28 percent, between ages 20 and 29; and 7 percent, between ages 30 and 39. In the first age group, almost 60 percent were male. In the second age group, 97 percent were male while in the third age group 75 percent were male. The average length of hospital stay at the detoxification unit was 1.75 days (I. Nagy, personal communication, July 12, 1993).

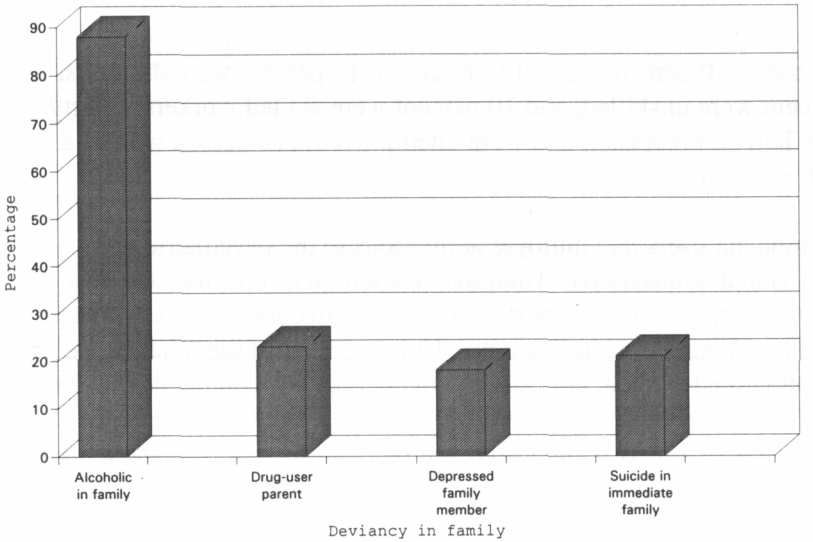

FIGURE 5. *Parents.*

SOURCE: Budapest Drug Outpatient Clinic, Hungary (unpublished data, 1992).

GYOR-SOPRON-MOSON COUNTY, GYOR CITY

The county of Gyor-Sopron-Moson is in the northwest part of Hungary, bordering on Austria and the Slovak Republic. It is more developed and industrialized than the eastern counties. Its population is over 330,000. Its largest city, Gyor, has 150,000 inhabitants. The county hospital, found in Gyor city, serves over two-thirds of the population of the county. A review of admissions to the detoxification unit for the period of 1975 to 1992 resulted in only 17 cases of inhalant intoxication. These cases were admitted during 1981 and 1982, and one individual was admitted in 1993. They were all males. Before and after those two years (1981 and 1982). no intoxicated inhalant user was admitted to the unit. The average number of annual admissions is currently about 400. These mainly were alcohol intoxications and overdoses of prescription drugs.

At the psychiatric unit of the hospital during this same period (1981 and 1982), 34 individuals were treated for inhalant use or its consequences: 33 males and 1 female. Medical records indicate that the average age at admission was 15.7 years and that the first experience with an inhalant was reported at an average age of 15.4 years. All used a glue product

(with the main psychoactive component being toluene), accompanied in one case with alcohol and in another case with a prescription drug. Of the 33 users, 40 percent were still in school, 17 percent were dropouts, 27 percent were unskilled, and 10 percent were skilled workers. Thirty percent had no profession and were unemployed; one person was on a disability pension.

These inhalant users had multiple admissions to the psychiatric unit (56 individual admissions). Their average length of hospital stay was 7.6 days. Of the 33, two were diagnosed as schizophrenics (ICD 9) and experienced longer hospitalizations. Thirty percent of the inhalant user group attempted suicide, one patient having died by hanging during his treatment (one of the schizophrenics). Forty-three percent had been arrested. These arrests mainly involved petty thefts, but rape and assault were involved in two cases.

Ninety-seven percent were brought up in a family environment, and the rest were in foster care. Nineteen percent had lost one of their parents, 25 percent had at least one alcoholic in his or her family, 3 percent had a parent who had been a psychiatric patient, 10 percent had a criminal in the family, and 43 percent came from broken homes (figure 6).

A personality test (i.e., Rorschach) was given to 54 percent of the subjects, and several personality traits could be identified. The tests showed personalities that do not take responsibility, hide from conflicts, have serious identification problems, have dilemmas with separation and bonding, have failure-determined attitudes with affective explosiveness, have high aggressive tension, and are susceptible to influence. The demonstrated behaviors hide loneliness. Individuals with these types of personality tend to daydream intensively, and the joy-seeking behavior makes them vulnerable to deviances (e.g., alcoholism, drug abuse). The two schizophrenics were diagnosed at first admission and were retested 2 years later. Neither exhibited psychotic signs other than potential suicide on the first test. The intelligence test showed a higher performance IQ in this group than in other drug-using subjects or in nonusers, corresponding with Creson's findings (1992). No dementia was found.

In the city of Gyor, the Crisis and Drug Outpatient Clinic was opened in the fall of 1991. No inhalant user has been admitted from the community. To obtain a more complete assessment of substance use among adolescents in Hungary, this clinic participated in a collaborative

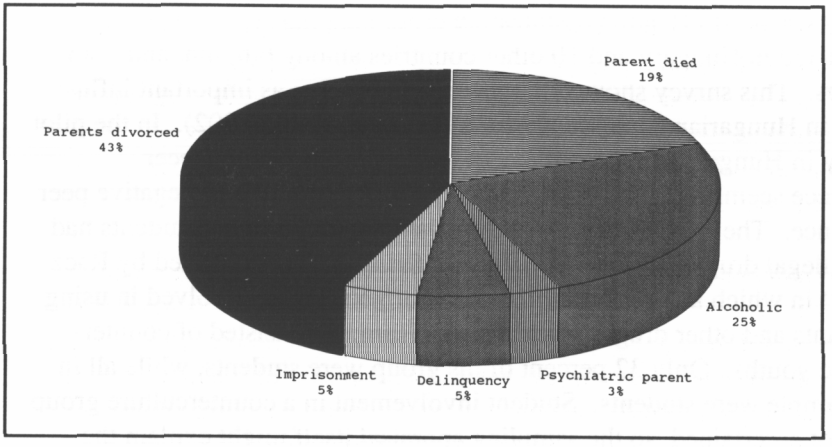

FIGURE 6. *Siblings (N = 33).*

SOURCE: Gyor County Hospital, Hungary (unpublished data, 1992).

pilot study with the Tri-Ethnic Center of Colorado State University. The American Drug and Alcohol Survey™ (Oetting et al. 1986) was developed and adapted to Hungarian circumstances and patterns of use (Nemeth et al., in press). The adapted questionnaire was filled out anonymously by 234 students in the 8th and 11th grades. The average age of the 8th graders was 14.2 years, and the average age of the 11th graders was 17.0 years. The highest lifetime prevalence of inhalant use was found in 8th-grade females (2 percent), while past-month prevalence in all groups was close to 0. Inhalants (and nitrites) were perceived as being "fairly easy" or "very easy" to obtain by over 50 percent of the 8th-grade students and over 75 percent of the 11th-grade group. There was no statistically significant difference between genders. Students' relative lack of substance involvement, with the exception of alcohol and cigarettes, is interesting especially in light of the perceived availability of these substances. The attitudes young people have toward drug use and their perception of harmful effects of use have much to do with whether they use drugs or not (Oetting and Webb 1992). The virtual lack of experimentation even when substances are perceived to be readily available to students is a good sign. Most students indicated that they did not and do not plan to use drugs in the future. It is important that these intentions are maintained and strengthened by educating students about the harmful effects of drugs.

In 1990, a World Health Organization cross-national survey was conducted in Hungary and 10 other countries among 6th, 8th, and 10th graders. This survey showed that peer groups serve as important influences in Hungarian adolescents' lives (Coles and King 1992). In the pilot survey in Hungary, the percentage of students with positive peer influence seems to be much higher, compared to those with negative peer influence. The lifetime prevalence data show that very few students had tried illegal drugs. This is in contrast to those findings reported by Racz (1992) in which a substantial proportion of youth were involved in using inhalants and other drugs. Racz's (1992) sample consisted of counterculture youths. Only 32 percent of his group were students, while all in this sample were students. Student involvement in a counterculture group was not ascertained, so the sampling appraisal itself might explain the disparity in rates of drug use between the two studies. Racz's (1992) results support the peer cluster theory (Oetting et al. 1986, 1987*a*, 1987*b*), which assumes that the counterculture youth who remain connected to society through family and school are much less likely to use drugs.

BARANYA COUNTY, PECS CITY

Baranya County is located in the southwestern part of Hungary and is home to 417,000 inhabitants. The capital of the county, Pecs, has 215,000 residents. This is a multiethnic county, where 40 percent of the population are German, 25 percent are Serbs and Croats, 5 percent are gypsies, and the remainder are Slovaks, Slovenes, and Romanians. The county considers itself disadvantaged not only because of ethnic problems but also because unemployment is very high. Once this was the center of the coal industry, and currently mines are closed.

A drug outpatient clinic was opened in 1987 in Pecs, and it has data on its clients since that time.[1] The number of registered drug users in 1987 increased from 196 to 355 by the end of 1992. The new admissions peaked in 1988 (from 27 in 1987 to 61 in 1988) and then decreased to 22 in 1991 and 33 in 1992. Social workers and a network of human service workers serve as an "alarm system" for the community; that is, they visit families, schools, and workplaces to find problem youth. It probably is due to this system that the drug center has so many inhalant abusers. Out of the total number of clients, 75 percent are inhalant abusers, with little education (3-4 grades completed in elementary school), and 75 percent are males. Seventy-five percent live in urban and 25 percent in rural

environments. Males range in age from 8 to 30 years, with an average age of 22.7 years, females range in age from 15 to 28 years, with an average age of 22.4 years (figure 7). They first tried inhalants betweenages 8 and 12 years. Only 10 percent received continuous treatment. Eighty percent of registered clients were gypsies. In the previous regime, it was strictly forbidden to ask about ethnicity or religion.

More research is needed on the circumstances and conditions that put one population at more risk than another and what cultural norms and values are related to drug abuse.

CSONGRAD COUNTY, SZEGED CITY

Csongrad County is considered the most vulnerable area for drug abuse in the county. This is because the region neighbors the former Yugoslavia, resulting in heavy drug traffic entering the country, exposure to a cultural heritage that impacts patterns of alcoholism, and a high suicide rate. As a result, there has been a sharply increasing trend of drug abuse. This region pioneered efforts in treating drug addicts and drew national attention to the issue. The founder of the drug outpatient clinic and former director of the Mental Health Center for Adolescents in this area, Dr. Teresia Farkasinszky, was the first in the country to collect data on the drug-abusing population and to emphasize the need for a detection and treatment system in the city of Szeged. She published widely on glue sniffing in 1976. She found that, out of 50 glue-sniffing subjects, 88 percent were under age 14, 82 percent were males, 36 percent came from broken homes, and 46 percent came from dysfunctional families (Farkasinszky 1976). Tracking the trend of abused drugs, she noted the dramatic change in drug abuse patterns from inhalant abuse to the abuse of opiates and other drugs in the mid-1980s (figure 8). Later she reported the data she collected between 1975-1986 on the magnitude of drug abuse in 467 individuals.

Of 430 registered drug users, 21 percent used inhalants as their primary drug of choice, while opiates were used by 68 percent and 9 percent used marijuana. There was a tenfold increase in the number of registered patients seen in treatment. These unpublished data were provided by Karoly Zelenai and colleagues; Dr. Zelenai assisted in the analysis of the data and directs the clinic at present.

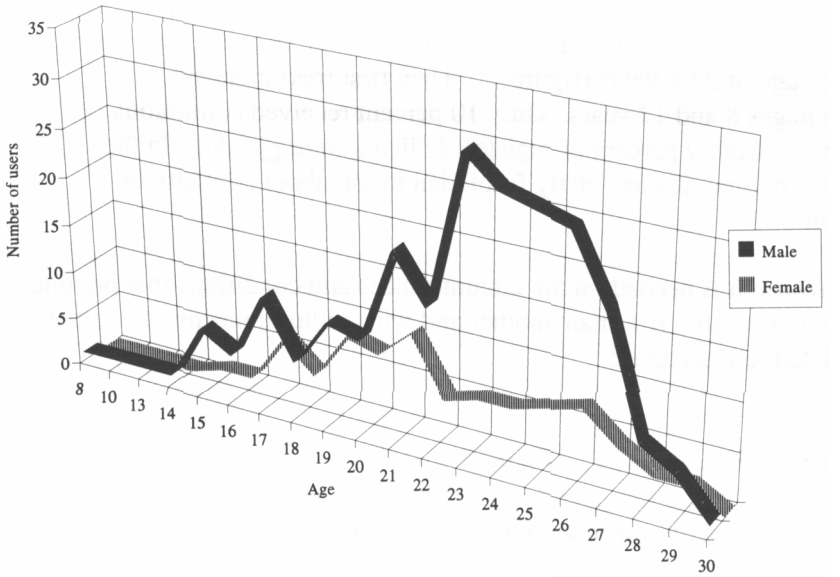

FIGURE 7. *Number of inhalant users by age (N = 305).*

SOURCE: Pecs Drug Outpatient Clinic, Hungary (unpublished data, 1992).

SUMMARY

While drug abuse in general has been a phenomenon experienced in Hungary since the late 1960s only sporadic studies were conducted at that time because the general attitude and policies of the previous regime ignored social problems in general. It took more than 20 years to change this attitude and to focus on social problems such as alcoholism, suicide, drug abuse, and delinquency. This delay in emphasis was due to lack of research expertise on these issues and the fact that Hungary was unable to join the international research community in the drug field for a long time. The pattern of drug abuse changed during this period of time from an endemic level of inhalant abuse to a dramatic increase in the total number of abusers. In 1989, political changes occurred; Hungary proclaimed its new constitutional, republican form of government. With a more liberal foreign policy, opened borders, and growing tourism, organized drug marketing appeared, and hard core drugs became more

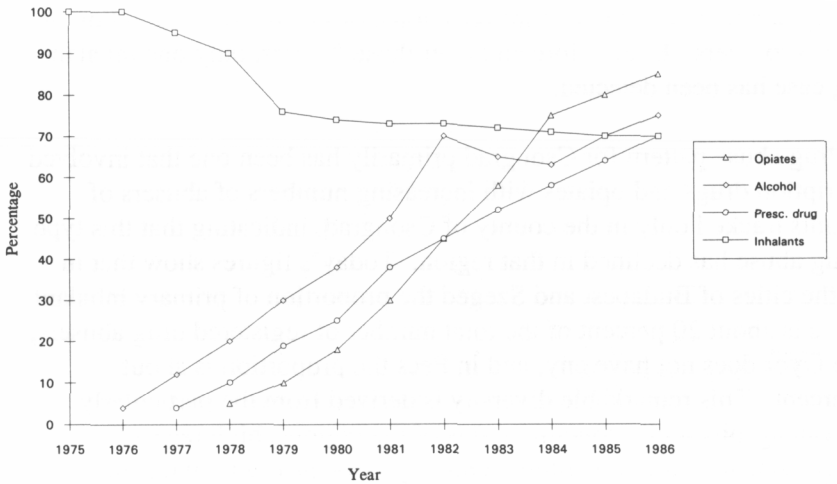

FIGURE 8. *Trend and pattern of drug abuse between 1975 and 1986.*

SOURCE: Szeged Mental Health Center for Adolescents, Hungary (unpublished data, 1987).

readily available. This condition has been worsened by civil war in the former Yugoslavia and as the East-West drug route crossed Hungary with growing supplies of drugs.

Hungary lacks reliable epidemiologic data on drug abuse. The objective of this chapter has been to draw attention to the need for epidemiologic research by gathering and analyzing information from available sources, in order to review the drug abuse situation and to highlight areas where further research is needed.

From both general and regional studies, it can be seen that inhalant abuse is not the current primary drug abuse problem in Hungary. The trend has never been tracked consistently, but available information shows that with a few exceptions only small groups were concerned and that there has been geographic diversity. This was the first drug abuse phenomenon that directed the attention of a few clinicians to the problem. The first studies conducted in the mid-1970s in Budapest and Szeged showed that glue sniffing occurred among the young and poorly educated with dysfunctional family backgrounds. Gyor in 1981 and 1982 is an example

of an epidemic, when inhalant intoxication cases came to the attention of service providers. Both before and after those 2 years, only one inhalant-using case has been detected.

The drug abuse pattern for Csongrad primarily has been one that involved prescription drugs and opiates with increasing numbers of abusers of inhalants trackted only in the county of Csongrad, indicating that this type of drug abuse has declined in that region. Today's figures show that in both the cities of Budapest and Szeged the proportion of primary inhalant abusers is about 20 percent of the total number of registered drug abusers, while Gyor does not have any, and in Pecs the proportion is about 85 percent. This remarkable diversity is derived from the particularly disadvantageous socioeconomic status of the regions, high rates of unemployment, and multicultural ethnicity associated with inhalant abuse. However, because this was not examined in the other regions, it is difficult to assess the importance of cultural factors.

NOTE

1. Eva Paulos, M.D., Director of Drug Outpatient Clinic of Baranya County, assisted the author in the analysis of these data.

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Solvent Abuse Trends in Japan

Hiroshi Suwaki

RECENT TRENDS IN SUBSTANCE ABUSE IN JAPAN

National epidemiologic data from household surveys on substance abuse are unavailable in Japan. However, the number of arrests for substance control law violations is one of the indicators that suggest the magnitude of the problem. Figure 1 presents the number of arrests for the violations against various substance control laws from 1950 to 1988. In the case of organic solvents. persons diverted to treatment also are included in the number, as most of the solvent abusers are under the age of 20.

The numbers of abuse cases involving marijuana and heroin are relatively low as reflected in medical emergencies. Only a few cases resulting from those substances were treated in hospitals in recent years throughout the country. However, arrests for violations against the Cannabis Control Law were substantial in number. There is a discrepancy between the number of arrests for Cannabis Control Law violations and the magnitude of resultant social and medical problems. In contrast to marijuana and heroin, the magnitude of abuse of organic solvents and methamphetamine have been uniquely high and continuous since the early 1970s. In 1988, data compilation methods of the National Police Agency changed, and the figure no longer included individuals diverted to treatment for solvent abuse (figure 2). During the next 2 years, the trend reflects a continuation of the high plateau.

Table 1 shows the number and percentage of psychiatric patients with various types of substance abuse problems from 1976 to 1991. In Japan, stimulant abuse almost exclusively involves methamphetamine. For unique reasons, cocaine is classified in the same group with morphines, both legally and administratively. Patients who are treated in psychiatric hospitals tend to have a long history of abuse, become dependent, and exhibit mental symptoms. Psychiatrists observed an epidemic in psychiatric hospitals admissions for solvent abuse between the mid- and late 1970s. In 1976, patients with solvent abuse accounted for 17.7 percent of all substance abuse patients. In 1981, the percentage rose to 41.5 percent and still continues at a high level. The proportion of methamphetamine abuse also is around 40 percent, similar to that of solvent abuse (see stimulants on table 1).

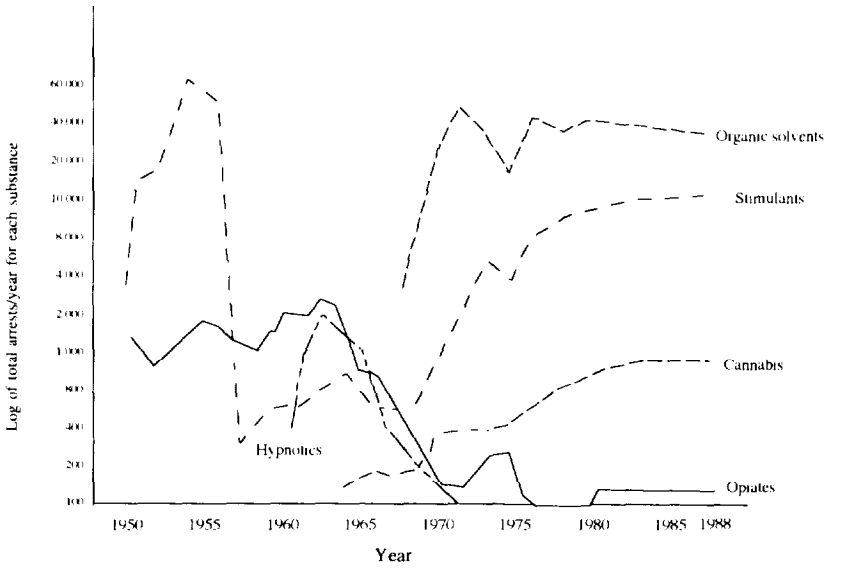


FIGURE 1. *Arrests for drug statute violations, excluding alcohol.*

SOURCE: National Police Agency (1989).

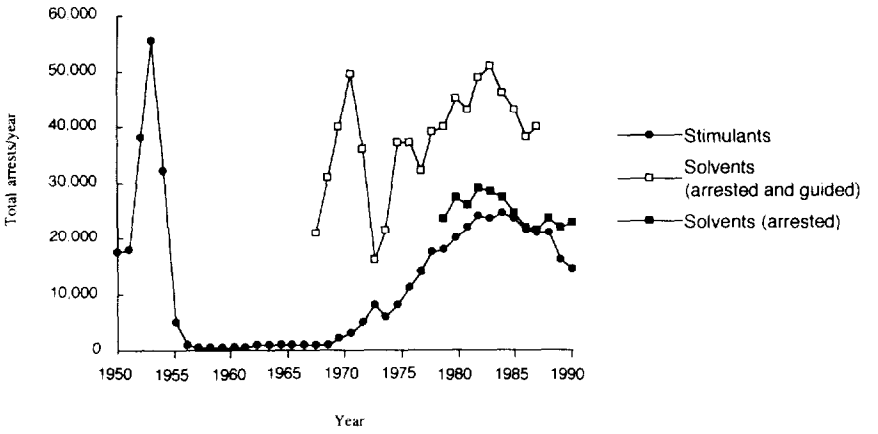


FIGURE 2. *Arrests for stimulants and solvents statute violations.*

SOURCE: National Police Agency (1989, 1991).

TABLE 1. *Psychiatric patients of substance abuse (values in percentages).*

Substance of abuse	Year					
	1976	1981	1982	1987	1989	1991
Stimulants	31.3	40.3	42.7	39.2	40.8	35.3
Solvents	17.7	41.5	38.9	34.2	38.7	40.7
Hypnotics	13.5	6.0	5.4	9.6	5.5	6.9
Antianxiety drugs	9.4	1.2	2.0	2.4	1.9	2.7
Analgesics	25.0	7.1	9.6	9.5	7.0	6.5
Cough syrups	—	—	0.7	3.4	3.9	3.4
Cannabis	—	—	—	0.1	0.8	1.3
Cocaine	—	—	—	—	0.2	0.2
Morphine	1.0	0.4	—	—	—	—
No. of patients surveyed	96*	571	803	881	915	938

KEY: * Inpatients only.

SOURCE: Fukui (1993).

HISTORICAL TRENDS IN SOLVENT ABUSE

In 1960, there were sporadic anecdotal reports that paint thinners were being inhaled by prisoners as a substitute for alcohol. In 1962, the police of Gumma Prefecture reported that a few adolescent workers intentionally

had inhaled the vapor from lacquer thinner and become intoxicated. These represented, however, only sporadic and limited reports of solvent abuse. In 1967, young vagrants known as Futen began to stand in front of the Sinjuku Station in Tokyo, openly inhaling solvent vapors from plastic bags. Shortly thereafter, solvent inhalation spread throughout Japan. Figure 1 documents this epidemic. Figure 1 also shows an epidemic of hypnotic analgesics abuse between 1960 and 1965. This occurred among teenage delinquents and school dropouts and predates solvent abuse. Both had a common feature; that is, both were group-oriented activities among teenagers. At that time even youngsters were able to buy hypnotics quite freely at a drugstore, and they consumed relatively high doses of those substances, often with alcohol, to get into an intoxicated, dreamy state. Later the sale of those drugs was legally restricted, so youngsters replaced hypnotics with organic solvents, which are cheaper, easier to obtain, more potent, and quicker to create a dreamy trip than hypnotic drugs.

Today, solvent abuse is found in virtually every prefecture of Japan. Many of those who abuse are young solvent abusers who experiment for a short period, but some develop into long-term solitary heavy users with disturbed psychopathology. Epidemics at the initial stage of abuse has become endemic, since use is closely connected with the subculture of school dropouts and delinquent groups. Initially, solvent abusers were open in their activities. Afterwards, they became more secretive, mainly as a reaction to the efforts by authorities to eradicate the problem.

SITUATIONS IN KAGAWA PREFECTURE

Kagawa Prefecture, where the author now works, is located on Shikoku, the fourth main island in southern Japan. It has a population of slightly more than 1,000,000 people, representing about 1 percent of the total population of Japan (figure 3).

Figure 4 shows the number of juveniles diverted to treatment for solvent abuse in Kagawa Prefecture and in Japan. For the past 10 years, solvent abusers both in Kagawa and in Japan have been decreasing somewhat, with the national decline being sharper. Table 2 presents the sources of solvents among 206 juveniles directed to treatment for solvent abuse in 1991; 61.2 percent bought the substances at various shops, and 18.4 percent stole them from shops or workplaces.

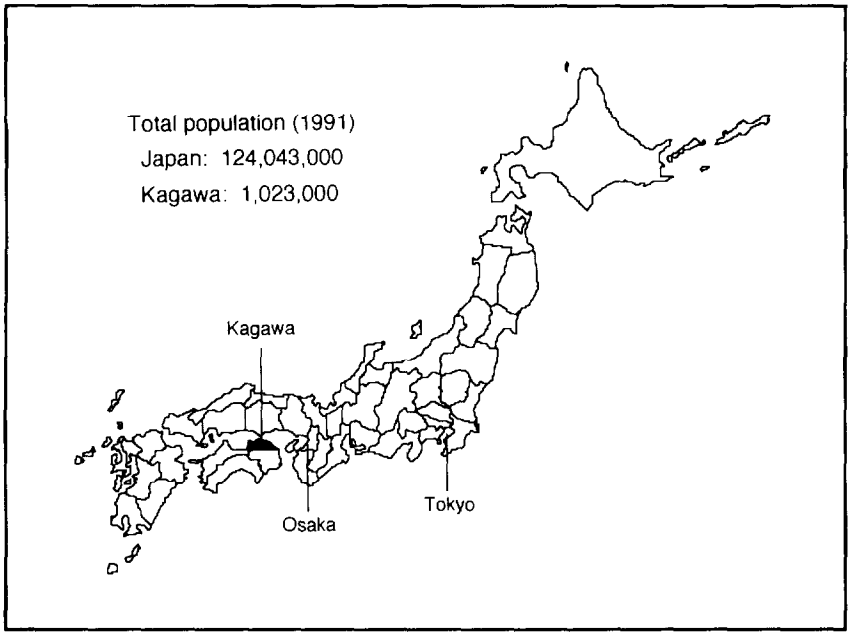


FIGURE 3. *Location and population of Kagawa Prefecture.*

SOLVENT ABUSE AMONG HIGH SCHOOL STUDENTS

Fukui and colleagues (1991) conducted an extensive survey of solvent abuse among 5,240 junior high school students in 12 public schools in Chiba Prefecture near Tokyo. One-and-a-half percent of all students reported use of solvents at least once in the past, including 2.1 percent of male students and 0.9 percent of female students. This percent might be an underestimate, since the survey was conducted among students who were in classrooms at the time of the survey and these might have been relatively healthy students who attend school on a regular basis. Many solvent abusers are thought to be absent or dropouts from school. The survey also suggested that nonusers have more satisfying school and family lives than solvent users.

BACKGROUNDS AND PROGNOSIS OF ADOLESCENT SOLVENT ABUSERS

Results of a study of 64 cases of solvent abuse who presented to the Child Guidance Center will be described (Suwaki et al. 1982). Child Guidance Center primarily is an assessment center and works with clients, their

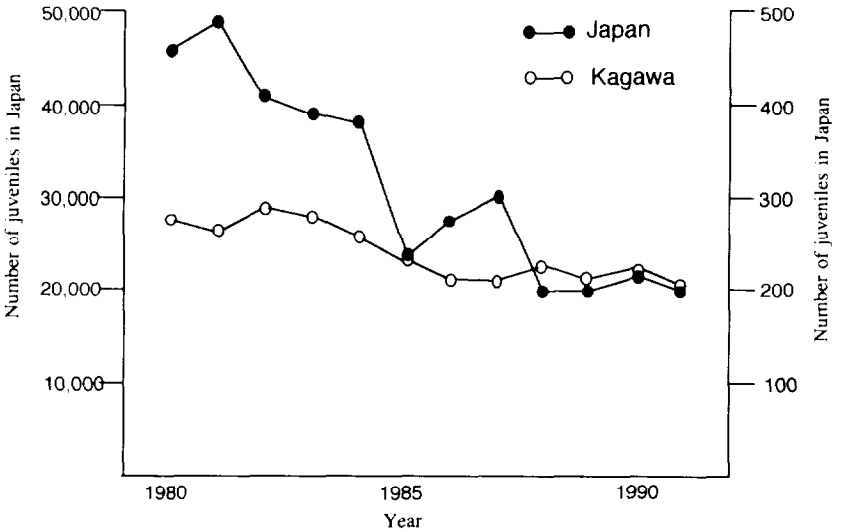


FIGURE 4. *Numbers of juveniles guided for solvent abuse in Kagawa and in Japan.*

SOURCE: Kagawa Prefectural Office for Countermeasures of Substance Abuse (1992).

families, and schoolteachers to manage the problems of youth. The center refers clients to a treatment facility or a family court if deemed necessary.

Although the study was conducted 10 years ago, the essential features of solvent abusers are believed to characterize the present situation:

There were twice as many males (67.2 percent) as females among the 64 subjects. Age at the time of consultation ranged from 11 to 17 (table 3); it should be noted that the study involved 10- to 18-year-olds. Junior high school students (13 to 15 years old) accounted for the majority of cases (87.5 percent). Table 4 shows the age at initial inhalation of solvents among the 64 clients. Most of the students first used while in junior high school, and they initiated 1 year before they began consultation. Frequency of inhalation generally is once a week or a few times a month, mostly with peers.

TABLE 2. *Routes to obtaining volatile solvents.*

Route	Given by peers or delinquent groups	Buying at carpentry shop, supermarket, etc.	Stealing	Other
No. of persons	126.0	28.0	38.0	14.0
Percentage	61.2	13.6	18.4	6.8

SOURCE: Kagawa Prefectural Office for Countermeasures of Substance Abuse (1992).

As for school records, only five subjects were rated above average, and the remainder were below average to poor. Among the 45 subjects on whom intelligence tests were performed, 21 had an IQ of 100 or above, 20 cases, 80-100, and 4 cases, 60-80. As regards the economic state of the family, 46 cases (7 1.9 percent) belonged to the low-income bracket, and 13 cases (20.3 percent) were from households on welfare.

Among fathers of clients, there were 13 cases of alcohol abuse, 7 of gambling, and 12 of idleness. By contrast, problematic behavior of the mother was far less noticeable. There may be a difference in the behavioral characteristics between men and women in Japanese culture.

Women in Japan tend to be subordinate to men and express their anxiety and other emotions in more suppressed and disguised ways. Men express them in overt behavioral ways. However, marital and family relationships in Japan are changing rapidly toward those of Western culture.

Living conditions for the 64 subjects were investigated an average of 6.7 years after their consultations. In 49 cases out of 64, interviews were conducted with the client or with his or her family. The remaining 15 cases could not be reached, either because they had moved from the original residence or because they refused to be interviewed. A detailed account of the present living situation was obtained of 42 cases (65.6 percent). Thus, even in Japan, such a small homogeneous country where

TABLE 3. *Age appeared to consultation office.*

Age	Number of clients	%
Under 10	—	—
11	1	1.6
12	4	6.3
13	16	25.0
14	30	46.9
15	10	15.6
16	2	3.1
17	1	1.6
Over 18	—	—
Total	64	100.1

SOURCE: Suwaki et al. (1982).

people live closely related to each other, it is quite difficult to contact persons and conduct followup research.

Table 5 shows the clients' occupational status at the time of the followup interview. Twenty-six subjects were employed, five were jobless, four were attending school, five were housewives, and two were in a reformatory or in a prison. As to substance abuse during the year preceding the followup interview, six subjects admitted solvent inhalation. All were male, and five were in their late teens. The frequency of inhalation was daily in one case, several times a month in three cases, and indefinite in two cases. Methamphetamine abuse was observed in three cases, but there were no problems recorded with narcotics, hypnotics, or marijuana. Table 6 shows the overall social adjustment, which was evaluated at three grades: (1) good, where no problems were observed in any social area; (2) relatively poor, where unstable factors such as absence from office or school or frequent occupational changes were observed; and (3) poor, where there was poor

TABLE 4. *Age of initial inhalation.*

Age	Number of clients	%
Under 10	—	—
11	2	3.1
12	9	14.1
13	27	42.2
14	22	34.4
15	3	4.7
Over 16	—	—
Unknown	1	1.6
Total	64	100.1

SOURCE: Suwaki et al. (1982).

adjustment to work or school (such as no job, criminal acts, admission to an institution, abuse of organic solvent or other drugs). Twenty-nine were in good social adjustment, 2 were in relatively poor adjustment, and 11 were in poor conditions.

Forty-two cases were divided into two groups: a group of 29 good cases, and a group of 13 poor or unstable cases (table 7). Between the two groups, factors concerning family backgrounds and present living conditions that might have a relationship to the prognosis of a client were examined using a chi-square test. A significant difference was observed concerning the influence of marital and economic status. Subjects who had a spouse presently living with him or her and who had good economic conditions had a favorable prognosis, but alcoholism and gambling by the father and the mother's holding of a job at a bar or similar establishment significantly indicated unfavorable prognosis.

TABLE 5. *Present occupational situation.*

Situation	Number of clients	%
At work	26	61.9
Out of work	5	11.9
Housewife	5	11.9
At school	4	9.5
At correctional institution	2	4.8
Total	42	100.1

SOURCE: Suwaki et al. (1982).

The survey revealed that 69.0 percent of clients were evaluated to be adapting well, which means many of them matured and grew out of their abuse when they became older. However, several subjects still continued solvent inhalation or changed to abuse of methamphetamine. As mentioned earlier, solvent abusers in the hospital population tended to be solitary dependent users in advanced stages of abuse. Personality characteristics included asocial and amotivational behavior, often accompanied by symptoms of mental problems.

LONGITUDINAL SUBSTANCE USE PATTERN IN SOLVENT ABUSERS

A longitudinal study of substance abuse among 51 psychiatric patients who once had experienced solvent inhalation suggests three pattern types of abuse. Type I is exclusive solvent use, with a limited amount of alcohol and tobacco use (figure 5). The patients of this type are younger, and the durations of their abuse is shorter. Two schizophrenics were in this group, and they exhibited asocial and withdrawal behavior but had no history of delinquency.

TABLE 6. *Present social adjustment.*

Adjustment	Number of clients	%
Good	29	69.0
Relatively poor	2	4.8
Poor	11	26.2
Total	42	100.0

SOURCE: Suwaki et al. (1982).

Type II, shown in figure 6, is a multiple-abuse type with a relatively short duration of solvent abuse of about a year. Many of these patients exhibit alcoholism later, but they sustain fairly stable levels of family and social life.

Type III (figures 7(a) and 7(b)) is the multiple-substance abuser with the duration of solvent abuse surpassing 1 year. Within this type, **many** patients simultaneously or sequentially abuse various substances, especially methamphetamine, alcohol, and tranquilizers. In addition, more school and social dropouts are found within this type, and they have higher rates of divorce and unemployment. Thus, there seems to be a relationship between the duration of solvent abuse and prognosis. Intervention is necessary at the earliest stage of abuse if progression to other social problems is to be avoided.

CONCLUSION

Solvent abuse continues to present substantial health and social problems in Japan, especially among juveniles and adolescents. Organic solvents are more potent and hazardous than previously believed, and the availability of the substances virtually is unlimited. A number of

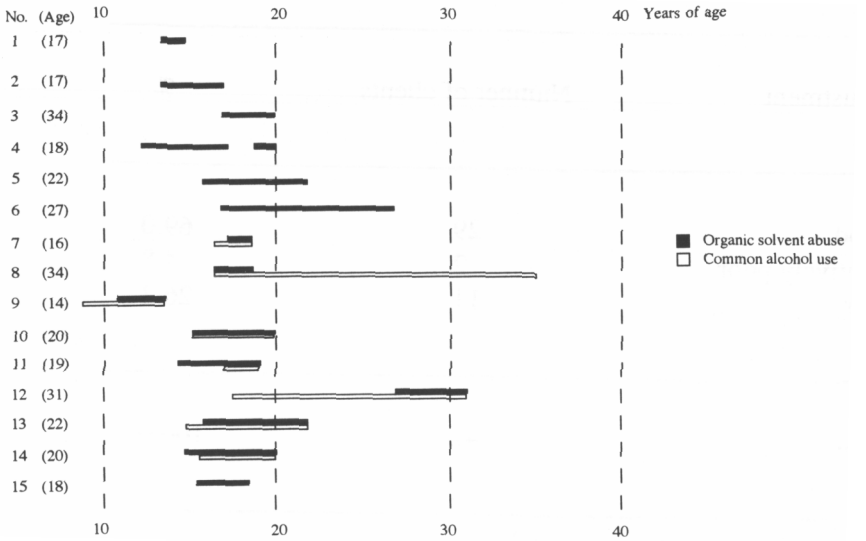


FIGURE 5. *Longitudnal pattern of organic solvent abusers. Type I. Single organic solvent use includes common alcohol use.*

SOURCE: Suwaki et al. (1991).

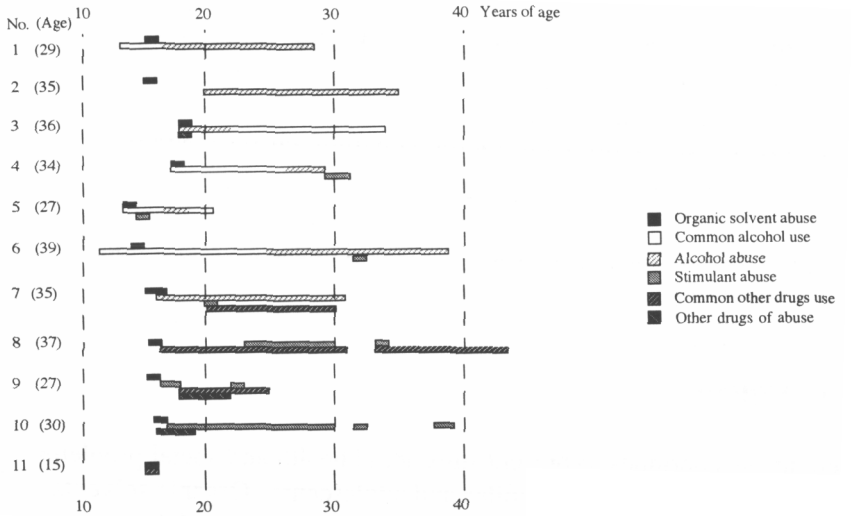


FIGURE 6. *Longitudinal pattern of organic solvent abusers. Type II: Organic solvent abuse of a short period.*

SOURCE: Suwaki et al. (1991).

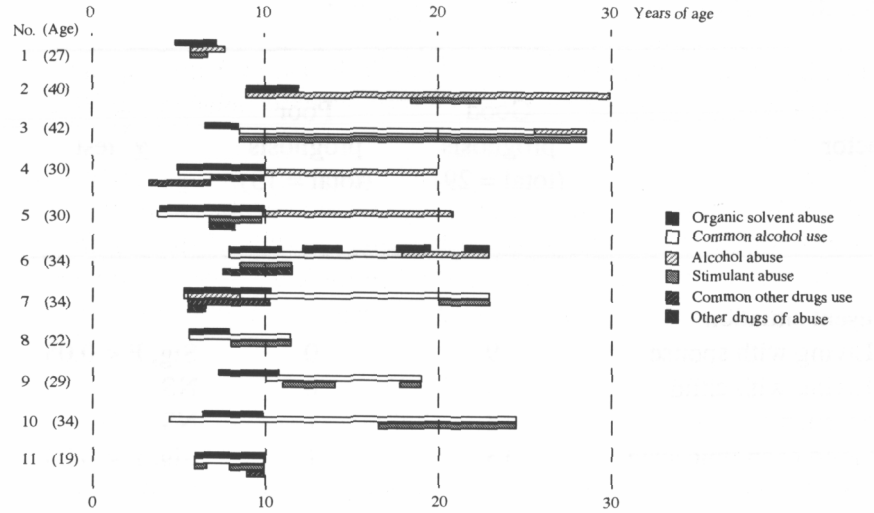
TABLE 7. *Prognostic factor analysis by x^2 test.*

Factor	Good prognosis (total = 29)	Poor prognosis (total = 13)	x^2 test
Present situation			
Living with spouse	9	0	Sig, P < 0.05
Living with child	4	0	NS
Married	8	1	NS
Good economic state	13	1	Sig, P < 0.05
At the time of consultation			
Alcoholism of father	2	4	Sig, P < 0.05
Gambling of father		24	Sig, P < 0.05
Mother's job at bar or similar establishment	2	4	Sig, P < 0.05
Overprotective attitude of mother	8	1	NS

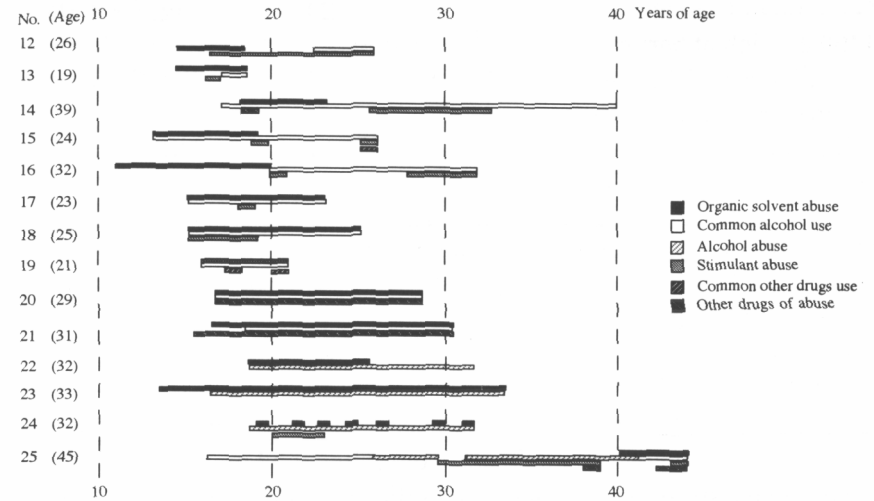
KEY: Sig = significant; NS = not significant.

SOURCE: Suwaki et al. (1982).

countermeasures against solvent abuse such as legislative efforts, public education, school and family guidance counseling, and psychiatric care have been employed, but they have had little effect on the problem thus far. A continued and expanded program is needed to aim at highlighting the seriousness of the solvent abuse situation. To accomplish this, integration of the activities of various facets of the community is essential.



(a)



(b)

FIGURE 7. *Longitudinal pattern of organic solvent abusers. Type III: Organic solvent abuse of a long period.*

SOURCE: Suwaki et al. (1991).

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Epidemiology of Inhalant Abuse in Mexico

Maria Elena Medina-Mora and Shoshana Berenzon

INTRODUCTION

Inhalation of substances with psychotropic effects is and has been, after tobacco and alcohol, the major drug problem in Mexico. Inhalants are the substances most commonly abused by children and adolescents, but they occupy second place in the general population. In 1976, abuse of inhalants was most prevalent among youngsters from the low socioeconomic level, but by 1980 it became popular in all social classes, with no differences in the rates of use. Though it is a class of drug used mainly at younger ages, an increase in the age of users is being noted, mainly among employees and seasonal workers and those working in the informal economy.

First use of these substances occurs at an age earlier than that observed for other substances. When compared to users of other drugs, males outnumber females, and users are significantly younger and come from a lower socioeconomic level, as inferred by the school status of the head of the family.

Students who report the use of solvents frequently are arrested and present more antisocial behavior compared to users of all other illegal drugs. They are similar to cocaine users, though inhalers more often steal; however, cocaine users present more violent behavior and get involved in selling drugs more often than inhalers.

The first data documenting inhalants as a substance of abuse comes from the 1960s. Since the beginning of the 1970s inhalant abuse has been included as part of prevention and treatment programs. In spite of this, use seems to be growing. It is the purpose of this chapter to review the epidemiology and prevention policies related to inhalant abuse in Mexico.

SOURCES OF INFORMATION

The main data source for this report is the last national school survey (Medina-Mora et al. 1993) conducted among high school students in Mexico, which for the first time included rural areas. The data are provided on a State basis. The sample design was stratified by schools and groups within the selected schools. A total of 2,330 groups were selected, and a total of 61,779 students completed the questionnaire. Fifty-two percent were male, and 47 percent were female; 20 percent were age 13 or younger, and 94 percent were 18 years of age or less (Medina-Mora et al., in press) (table 1). Data from previous school surveys conducted in the urban areas of the country and from biannual studies conducted in Mexico City also are included for review (Castro and Valencia 1979, 1980; Castro et al. 1982, 1986; De La Serna et al. 1991).

Another source consulted is the National Survey on Addictions (NSA), conducted in 1988 by two organizations within the Ministry of Health—the General Directorate of Epidemiology (DGE) and the Mexican Institute of Psychiatry (IMP). This household survey obtained prevalence data on the use of tobacco, alcohol, and nonprescription drugs, as well as illicit use of prescription drugs, within a random sample of 12,557 individuals between the ages of 12 and 65. The sample was selected by using the Ministry of Health's master sampling framework. Only residents of urban localities with over 2,500 inhabitants, which accounted for 65 percent of the national population, were considered. The sample design was stratified in several stages. Only one individual per household was interviewed; 84 percent of those sampled participated in the survey. The survey results were weighted according to the probability of selection. Handled in this manner, the data yielded results applicable to the urban national population aged 12 to 65 years and to each of seven regions (Medina-Mora et al. 1989; Secretaria de Salud 1990; Tapia et al. 1990).

Studies among high-risk groups, including those conducted among minors that work on the streets, also were reviewed (Leal et al. 1977; Medina-Mora et al. 1982; Ortíz et al. 1988). The most recent study was a census conducted in Mexico City by the city government with support of different governmental organizations and nongovernmental organizations (NGOs) (Departamento del Distrito Federal 1992). The main objective of this study was to define the conditions of children whose survival

TABLE 1. *National school survey: Demographic characteristics of high school students.*

NATIONAL SAMPLE (N = 61,779)	%
GENDER	
Males	52
Females	47
AGE	
13 or younger	43
14	20
15	14
16	10
17	6
18 or older	5
STUDENT DURING PREVIOUS YEAR	
Full-time	72
WORK STATUS DURING PREVIOUS YEAR	
Did not work	75
URBANICITY	
LIVED MOST OF THEIR LIVES IN	
Big city	16
Medium-size city	35
Small city	15
Rural areas	30
SCHOOL STATUS OF THE HEAD OF THE FAMILY	
No. of years elementary school completed	
No formal schooling	13
1-6 years	38
7-9 years	19
l0-12 years	10
13+ years	13

NOTE: Because of omitted data, total is not 100 percent.

SOURCE: Ministry of Public Education and Mexican Institute of Psychiatry.

depended on their activity in the streets. Two types of children were differentiated: (1) children from the street, characterized as minors who have no family relations, sleep on the streets, undertake marginal economic activities, and are at risk of antisocial and delinquent behaviors and of being abused by the adults who surround them (i.e., prostitutes and robbers, among others), and (2) children on the streets who have family relations, attend school, and work on the street to earn some money to help the family. These are also at risk of dropping out of school, of leaving their family, and to the aggressions of the environment.

All children in these circumstances were interviewed. Places used by the children to sleep and work were identified at the initial stage. They were subdivided in four groups according the type of children found and the type of activity performed: (1) primary meeting places—both types of minors in and from the street are found here, these places are used usually during conventional hours (e.g., weekdays and during the day time); (2) meeting places—used mainly on Sundays; (3) night spots—concentrations of children who gather, work, or sleep (children from the street are found here); and (4) sleeping places—children whose main residence is the street are found in these places (places include specific streets, bus stops, parking lots, and uninhabited land).

Once the places to be studied were determined, 13 sampling points were defined according to activity and type of children to be found. Special observation routes were determined based on the closeness and density of minors to be found in each sampling slot or encounter point. One hundred and three such routes and 515 meeting places were studied. The study had a 3-percent error or duplication in the identification of the children. A total of 11,172 children were identified; 75 percent were between 12 and 17 years of age, at an average of 13 years, and 72 percent were male and 28 percent female. Males were older, between 14 and 17 years, while females were between 13 and 14 years of age. Seven hundred and thirty-nine such children were selected randomly for interview.

Data also were drawn from the Information System on Drug Use, coordinated by the IMP (Ortíz et al. 1989). All cases seen in 44 different health and justice institutions were screened twice a year for any drug use, independently of the reason for arriving at the institutions. All of those cases with a positive history of drug use, from experimentation to heavy use, were questioned further using a reporting form based on World Health Organization (WHO) core items for drug use surveys

(Hughes et al. 1980). The system has been in operation for Mexico City since 1987.

Finally, the report also is based on statistics routinely collected by the Government and treatment services and compiled by the Information Center on Drugs of the IMP and from the recently installed System on Drug Surveillance (SISVEA) (Secretaria de Salud 1992) and the National System of Treatment and Rehabilitation of Addicts (SINTRA), coordinated by the National Council Against Addictions (CONADIC). SISVEA collects information on 11 sites or cities of the country, including Mexico City from: (1) statistics of subjects in treatment, mortality indicators, and health consequences; (2) sentinel posts located in primary care units and emergency rooms; and (3) interviews with different types of populations on a nonrandom basis. SINTRA is a national registry of addicts in treatment and is in the process of being established.

NATURE AND SCOPE OF THE PROBLEM

Incidence and Prevalence of Use and Abuse

According to the NSA, 4.76 percent of the urban population (i.e., 1,713,000 persons between the ages of 12 and 65 years) have consumed one or more drugs other than tobacco and alcohol in their lifetimes; 2.06 percent used in the last 12 months, and 0.94 percent were active users at the time of the survey (defined as use in the previous 30 days). When only the young male population (12-34 years of age) was considered, the rates increased to 8.5 percent, 4.17 percent, and 1.18 percent, respectively. Rates among females were considerably lower. Inhalants (0.76 percent) were the second drug category of choice after marijuana (2.99 percent) and were followed closely by tranquilizers (0.72 percent) (Medina-Mora et al. 1989) (table 2).

Among high school students, inhalants are the substance of choice after tobacco and alcohol. In total, 8.2 percent of the students reported lifetime use of any drug other than tobacco and alcohol, 4.3 percent used drugs in the last year, and 2.49 percent within the last month. The percentages for solvents were 3.5 percent, 1.6 percent, and 0.8 percent, respectively. Use is considerably higher among males (Medina-Mora et al. 1993) (table 3).

TABLE 2. *National Household Survey: Prevalence of drug abuse.*

	Inhalants %	Marijuana %	Cocaine %	Tranquilizers %	Stimulants %	
			Ever use			
						Total
MALES						
12-34 years	1.94	6.8	0.79	1.02	0.40	8.50%
35-65	0.52	3.6	0.41	0.54	0.89	5.61%
						7.63%
FEMALES						
12-34	0.11	0.37	0.03	0.59	0.70	2.22%
35-65	0.01	0.19	0.01	0.30	0.42	2.04%
						2.15%
						4.76%

TABLE 2. *National Household Survey: Prevalence of drug abuse (continued).*

	Inhalants %	Marijuana %	Cocaine %	Tranquilizers %	Stimulants %	
			Last 12 months			
MALES						
12-34 years	0.69	3.10	0.53	0.65	0.27	4.17%
35-65	—	0.69	0.01	0.19	0.04	1.30%
						3.30%
FEMALES						
12-34	0.08	0.23	—	0.36	0.18	1.01%
35-65				0.10	0.08	0.78%
						0.93%
						2.06%

TABLE 2. *National Household Survey: Prevalence of drug abuse (continued).*

	Inhalants %	Marijuana %	Cocaine %	Tranquilizers %	Stimulants %	
			Last 30 days			
MALES						
12-34 years	0.14	1.54	0.41	0.22	0.08	1.18%
35-65	—	0.14	—	0.12		0.66%
						1.46%
FEMALES						
12-34	0.01	0.01	—	0.19	0.11	0.43%
35-65	—	—	—	0.04	0.07	0.54%
						0.47%
						0.94%

NOTE: * Percentages obtained from total population within each gender and each group.

SOURCE: General Directorate of Epidemiology, Mexican Institute of Psychiatry.

TABLE 3. *National School Survey: Prevalence of solvent/inhalant use as compared to other drugs.*

	Lifetime Use		Last 12 Months		Last 30 Days	
	Males %	Females %	Males %	Females %	Males %	Females %
Inhalants	4.59	2.32	2.20	0.75	1.09	0.66
Marijuana	2.48	0.50	0.99	—	0.62	0.13
Cocaine	1.09	0.36	0.44	0.13	0.28	0.13
Any illicit use	9.68	6.65	4.89	3.78	2.77	2.19
Tobacco	38.10	20.23	23.24	10.66	14.14	5.23
Alcohol	54.20	44.85	33.78	24.07	18.18	11.11

SOURCE: Ministry of Public Education, Mexican Institute of Psychiatry.

The highest rates for the previous 12 months were observed in Baja California, Mexico City, and States surrounding the capital (figure 1). Compared to rates reported by Johnston and colleagues (1993), for 8th-, 10th-, and 12th-grade students in the United States, rates in Mexico are lower. In the latter, rates of lifetime use varied from 3 to 4 percent, while in the United States rates were 4 times higher, varying from 16 to 17 percent. Nevertheless, when only daily use is considered, rates in Mexico for grades 10 and 12 are slightly higher: 0.26 percent and 0.1 percent, as compared to 0.1 percent in the United States.

In Mexico, inhalants also are the drug of choice of children working on the streets and among delinquent minors. In the capital city, epidemiological surveys conducted among minors (i.e., persons under 18 years of age), working on the streets in an area to the south of the city showed considerably higher rates of use than the ones observed among students and in household surveys. Twenty-seven percent of the children in the sample reported lifetime use of solvent inhalants, with 22 percent reporting daily use. Lifetime prevalence of marijuana was reported by 10 percent and daily use by 1.5 percent of the children interviewed. No other drugs were reported. School dropout and lack of contact with the family were strong predictors of drug use (Medina-Mora et al. 1982). De La Garza replicated this study in Monterrey and found that the incidence of drug use among minors working in the streets was quite low, but a high proportion of solvent users was found in poor communities (De La Garza et al. 1987). In Tamaulipas, the same author conducted a study among delinquent minors under 14 years of age and found that 42 percent of the minors who were institutionalized at the time of the study (N = 158) had used illicit drugs. Alcohol was the drug most commonly used (41 percent of the total users), followed by inhalants (27 percent), tobacco (17 percent), marijuana (14 percent), and psychotropics (1 percent) (De La Garza et al. 1987).

A study, coordinated by the Government of the City of Mexico, (Departamento del Distrito Federal 1992) reported that 22 percent of the minors interviewed admitted having friends who use marijuana and pills—8.5 percent admitted using these types of drugs, and 14.7 percent were inhalers. This study identified a greater number of female users (28 percent) than was observed in previous studies. In a previous study conducted in the early 1980s, only 5 percent of the street children were female, and none of them were inhalers. (Medina-Mora et al. 1982).

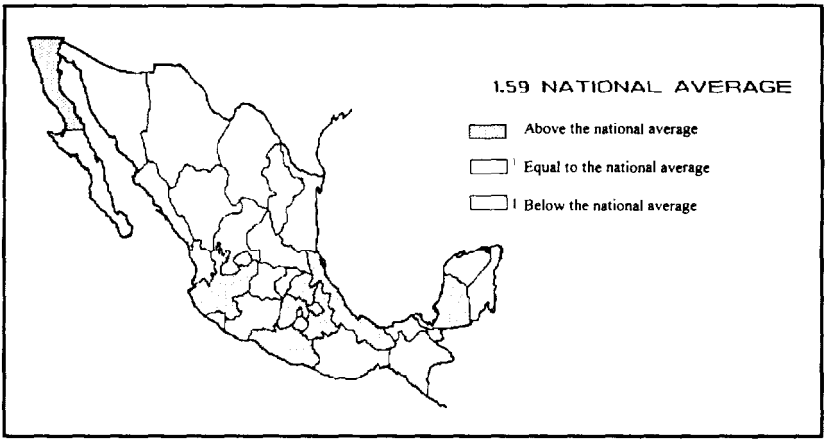

FIGURE 1. *National School Survey: Inhalants, last 12 months' use.*

PATTERNS AND TRENDS

Two patterns of use have been observed: (1) experimentation among students, in which users may try the drug only once or twice (61 percent of ever users), including those who stop after experimenting up to 5 times (19 percent), and (2) regular users (17 percent). Among minors working in the streets, regular use is common with few exceptions. Either they use regularly, several times a day, or do not use at all, with periods of use and abstinence (Ortiz et al. 1988).

Data from the household (Medina-Mora et al. 1989) and school surveys (Castro et al. 1986; Medina-Mora et al. 1992; De La Sema et al. 1991) suggest an increasing trend in the number of users of inhalants. Between 1974 and 1988, rates of lifetime use among the general population between 14 and 65 years of age increased from 0.4 to 0.7 percent.

Prior to 1980, inhalants were a drug group of preference in Mexico City, second only to marijuana, among students attending schools located in low socioeconomic areas. However, by 1980, it had extended to other groups until the same percentage of use was observed in schools of high, medium, and low socioeconomic status (SES). In 1976, the percentage of lifetime use of inhalants in Mexico City was 0.85 percent. It increased significantly in 1978 to 5.6 percent, and by this year it became more popular than marijuana and has occupied this place since then (Castro et al. 1980; De La Sema et al. 1989; Medina-Mora et al. 1993). The use of inhalants has remained stable through 1992, when rates of lifetime use increased significantly beyond the confidence intervals of the sample,

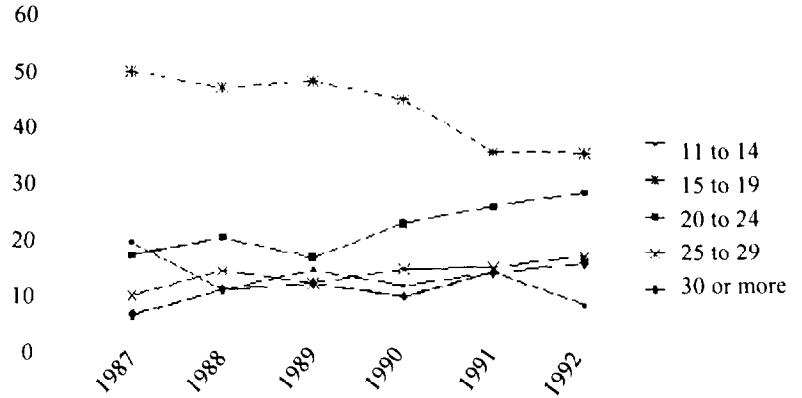

FIGURE 2. *Drug Registry System (SRID) trends of inhalant use by age.*

SOURCE: Ortiz et al. (1993); Mexican Institute of Psychiatry.

from 4.60 to 5.00 percent. Inhalant use in the last year increased from 1.78 to 2.4 percent and current use from 0.04 to 1.06 percent (Medina-Mora et al. 1993). At a national level, inhalation of substances with psychotropic effects, among urban students, increased between 1976 and 1986 from 0.9 to 4.7 percent (Castro et al. 1986).

Results from followup studies (Leal et al. 1977; Ortiz and Caudillo 1985) show that inhalant abuse usually stops with the maturation that occurs upon reaching young adulthood. A few users shift to marijuana and the vast majority to alcohol. In spite of this, the information reporting system shows a trend toward older users. In 1987, only 11 percent of cases related involved individuals older than 24 years of age, and 5 percent, 30 years and over. In 1992, the percentages were 30 percent and 14 percent, respectively (Ortiz et al. 1993) (figure 2). This trend is associated with an increase among employees and temporary workers (figure 3). Perhaps this increase in working users is due to the fact that inhalant substances are available more readily in the workplace than in other places.

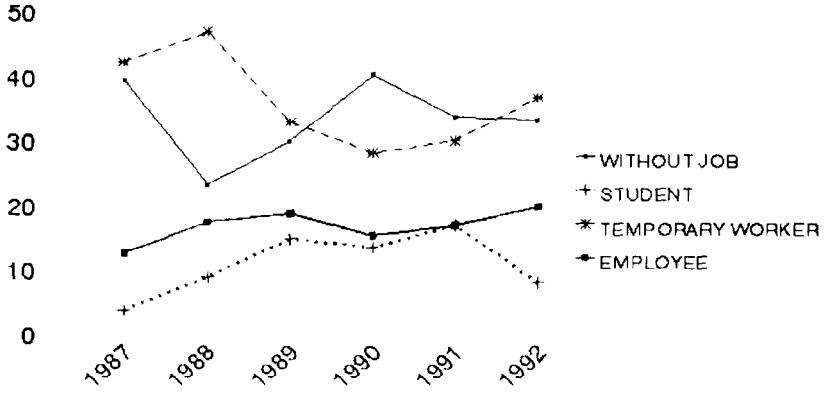

FIGURE 3. *Drug Registry System (SRID) trends of inhalant use by labor status.*

SOURCE: Ortiz et al. (1993); Mexican Institute of Psychiatry.

CHARACTERISTICS OF USERS AND ABUSERS

Inhalation predominantly is a practice of young males. In the urban population between 12 and 65 years of age, no use of inhalants was found among those older than 34 years (table 4). First use of these substances occurs at an earlier age than that observed for other drugs (i.e., 65.16 percent of users started before they were age 18). This occurs among less than half of marijuana (44.79 percent) and cocaine (45.91 percent) users, and among less than one-third (27.61 percent) of users of tranquilizers. On average, the first use of inhalants occurred at age 16. A friend often is the first person who provides the solvents, and the most common places for first use are public areas or a private house (table 5).

Among high school students, use of all drugs is higher among those 16 years of age and older. The only exception is solvents. The prevalence of use at the time of the survey (within the last 30 days) is higher among those younger than 16 (2.7 percent), compared to the older group (2.2 percent). No important differences were observed in the school level reached by the head[1] of the family of inhalers. Use is more common among students who have lived most of their lives in big cities (table 6).

TABLE 4. *National Household Survey: Prevalence of inhalation by population subgroups.*

	Inhalants			Any illicit use		
MALES						
	12-34	35-65	Total	12-34	35-65	Total
Lifetime use	1.94	—	1.52	8.50	5.61	7.63
Last 12 months	0.69	—	0.49	4.17	1.30	3.30
Last 30 days	0.14	0.52	0.10	1.18	0.66	1.46
FEMALES						
	12-34	35-65	Total	12-34	35-65	Total
Lifetime use	0.11	—	0.08	2.22	2.04	2.15
Last 12 months	0.08	—	0.06	1 .01	0.78	0.93
Last 30 davs	0.01	0.01	0.01	0.43	0.54	0.47

NOTE: Percentages obtained from total population within each gender and each group.

SOURCE: Secretaria de Salud (1990).

TABLE 5. *National Household Survey: Factors associated with first drug use.*

	Inhalants %	Marijuana %	Cocaine %	Tranquilizers %	Stimulants %
AGE OF FIRST USE					
12-17	65.16	44.79	45.91	27.61	19.95
18-25	30.29	42.38	30.80	39.03	37.12
26-34	4.44	8.88	23.29	13.16	35.53
35+	0.11	1.72	—	16.38	4.98
FIRST SOURCE OF DRUG USE					
Vector					
Family	8.55	5.87	2.94	42.01	8.98
Friend	46.01	84.01	71.41	23.88	50.62
Pusher	7.67	1.88	7.40	6.43	—
Pharmacists	—	—	—	6.16	31.06
PLACE					
Home	18.75	16.78	2.77	57.83	14.57
School	4.55	20.66	—	0.70	2.32
Work	16.83	9.09	18.06	2.91	17.94
Party	8.74	9.01	16.67	1.53	0.22
Bar	1.60	4.52	7.20	0.19	—
Public places	22.03	31.81	48.26	13.50	7.11

NOTE: Percentages obtained from total population within each gender and each group.

SOURCE: Secretaria de Salud (1990).

TABLE 6. *National School Survey: Prevalence of use by population subgroups.*

	Inhalants			Users of other drugs		
	Gender					
	Males (32.015) %	Females (29.124) %	Total (61.139) %	Males (32.015) %	Females (29.124) %	Total (61.139) %
Lifetime use	4.5	2.3	35	5.1	4.3	47
Last 12 months	2.0	1.1	1.6	2.8	2.6	2.7
Last 30 days	1.0	0.6	0.8	1.6	1.5	1.6
Daily	0.2	0.1	0.2	0.5	0.2	0.4

	Age											
	-13 (26.537) %	14 (12.166) %	15 (8.916) %	16 (6.356) %	17 (3.937) %	18+ (3.115) %	-13 (26.537) %	14 (12.166) %	15 (8.916) %	16 (6.356) %	17 (3,937) %	18+ (3.115) %
Lifetime use	2.9	3.9	3.8	4.0	3.7	4.0	29	4.5	5.1	6.8	8.4	11.0
Last 12 months	1.5	1.7	1.7	1.6	1.7	1.1	1.6	2.7	3.1	43	4.6	5.8
Last 30 days	0.9	0.8	1.0	0.7	1.0	0.5	1	1.5	1.8	2.5	2.2	3.2
Daily	0.2	0.2	0.2	0.1	0.1	0.1	02	0.5	0.4	0.8	0.6	07

TABLE 6. *National School Survey: Prevalence of use by population subgroups (continued).*

	Inhalants					Users of other drugs				
	School status of the health of the family									
	0 (7.855) %	1-6 (23.248) %	7-9 (11.953) %	10-12 (6.206) %	13+ (9.044) %	0 (7.855) %	1-6 (23.248) %	7-9 (11.953) %	10-12 (6.206) %	13+ (9.044) %
Lifetime use	36	3.3	3.5	3.4	3.7	4.3	4.1	4.2	5.9	64
Last 12 months	1.7	1.5	1.6	1.6	1.7	2.5	2.4	2.5	3.4	3.6
Last 30 days	1.0	0.8	0.9	0.7	0.8	1.6	1.3	1.5	1.9	2.1
Daily	0.1	0.2	0.2	0.1	0.1	0.6	0.3	0.4	0.5	0.5

	Urbanicity							
	Big city (9.757) %	Med.-size city (21.805) %	Small city (8.959) %	Rural area (18.590) %	Big city (9.757) %	Med. -size city (21.805) %	Small city (8.959) %	Rural area (18.590) %
Lifetime use	4.1	3.3	3.7	1.2	5.9	4.8	5.1	3.8
Last 12 months	1.9	1.4	1.8	1.4	3.7	2.7	3.0	2.1
Last 30 days	1.0	0.7	1.1	0.8	2.1	1.6	1.8	1.2
Daily	0.2	0.1	0.3	0.2	04	0.3	0.5	0.3

SOURCE: Medina-Mora et al. (1993).

RISK FACTORS

When students who report inhalation of psychotropic substances are compared to users of other drugs,[2] it becomes evident that males outnumber females in a higher proportion than that observed for users of other drugs; the students are significantly younger and have a lower SES, as inferred by the education level of the head of the family (table 7).

A logistic regression analysis showed that males were almost two times (1.94) more at risk of being inhalers as females. Students who worked at least 4 hours a day were 1.36 times more at risk, and those who did not study the year previous to the survey or were not full-time students were 30 percent mor at risk (1.30 times) of being inhalers, in relation to nonworking or full-time students (table 8).

Among minors working in the streets in Mexico City, school dropout, lack of contact with the family, early initiation in street work, drug use among brothers and peers, and migration from rural areas were strong predictors of drug use. Through a multiple categorical analysis, these variables strongly differentiated drug users from nondrug users by whether subjects were working in the streets, $R^2 = .42$ (Medina-Mora et al. 1982). Other studies conducted in the northern region of the country have not found a relation between migration and drug use, though differences become evident when causes of migration are analyzed. Migration associated with problems in the place of origin, such as delinquency or antisocial behavior among parents, were positively associated with drug use by sons (De La Garza 1987).

VULNERABLE POPULATIONS

Vulnerable populations may be defined as workers who use solvents on the job and children raised in family industries (usually located in their homes) and who use these substances (Berriel-Gonzales et al. 1977); street children (Departamento del Distrito Federal 1992; Gutierrez et al. 1993; Lea1 1977; Medina-Mora et al. 1982); and juvenile delinquents (De La Garza 1987).

TABLE 7. *National School Survey: Comparison between inhalant users versus users of other drugs, demographic characteristics (Mexico City).*

	Inhalant users %	Users of other drugs %
	GENDER	
Males	75*	53
Females	25	47
	SCHOOL STATUS	
7-9	70*	55
10-12	30	45
	AGE	
14 or younger	57.23	44.26
15-17	29.48	34.43
18 or older	12.71	20.09
X	14.67*	15.52
S	2.67	2.85
	SCHOOL STATUS OF THE FAMILY HEAD	
0	8.38*	4.22
1-6	33.53	22.79
7-12	35.93	42.19
13+	20.96	26.16

KEY: * $p <= 0.05$.

SOURCE: Medina-Mora et al. (1993).

TABLE 8. *Logistic regression predictors of use of inhalants.*

Predictors	Standard deviation	β	Odds ratios
Gender	0.05 15	0.6627*	1.9401
Age	0.0419	0.0330	1.0336
Urbanicity	0.0216	0.0641	1.0662
Not full-time student	0.0504	0.2633*	1.3012
Worked and studied	0.0523	0.3105*	1.3641
Intercept	0.0752	-4.1034	
Chi-square		322.0830	

NOTE: * p <= 0.001.

SOURCE: Medina-Mora et al. (1993).

SPECIFIC TYPES OF INHALANTS AND VOLATILE SOLVENTS USED

The substances most commonly used are shown in table 9. This list was obtained from the most recent school survey (Medina-Mora et al. 1993). All students were asked to name the substances with which they had experimented. The substances of choice were paint thinner and glue. This observation is consistent with what has been reported for other populations (Gutierrez et al. 1993; Ortiz et al. 1993; Secretaria de Salud 1990).

Street children have strong preferences for the substances they like to consume, toluene being the favorite for its psychotropic effects and lower degree of symptoms after an intoxicating event. The more experienced users make their own combinations or mixtures of substances to inhale (Gutierrez et al. 1993).

TABLE 9. *National School Survey: Specific types of inhalants and volatile solvents used.*

Name	Frequencies*	Combinations	Frequencies*
PAINT THINNER, GAS, AND ACETONES			
Paint thinner	393	Paint thinner, glue	163
Gasoline	23	Paint thinner, paint	5
Acetone	1	Paint thinner, liquid paper	1
Aguarras	2	Paint thinner, ink	3
Cement	28	Paint thinner, white/gasoline	19
Chlorine	1	Paint thinner, resistol	74
Treechlorine	1	Paint thinner, spray	45
		Paint thinner, cement	22
		Paint thinner, glue, spray	45
		Paint thinner, spray, other gas	10
		Paint thinner, resistol, gasoline	16
		Paint thinner, cement, spray	13

TABLE 9. *National School Survey: Specific types of inhalants and volatile solvents used (continued).*

Name	Frequencies*	Combinations	Frequencies*
GLUES			
Resistol 5000	221	Resistol 5000, paint thinner, cement	17
Glue/UHU, DUCO	149	Glue, resistol 5000	6
Glue PVC	18	Glue, spray, gas	11
Yellow glue	33		
Kola-loka	2		
Ink	11		
Liquid paper	15		

TABLE 9. *National School Survey: Specific types of inhalants and volatile solvents used (continued).*

Name	Frequencies*	Combinations	Frequencies*
SPRAYS			
Spray	153	Spray, glue	47
Active	2		
Laca	8		
Gel	1	Ink, spray	71

NOTE: * "Frequencies" means the number of students who used.

SOURCE: Medina-Mora et al. (1993).

Recently, users of these substances have reported inhaling fumes from pipes jutting out of industrial buildings. According to the NSA, this has been reported in the two more industrialized cities of the country, Monterrey and Mexico City (Secretaria de Salud 1990).

HEALTH AND SOCIAL CONSEQUENCES AND OTHER RELATED BEHAVIORS

In Mexico City, students who reported the use of solvents were arrested more frequently (4.10 percent) than users of other drugs (3.45 percent).[3] A higher proportion of inhalers reported a desire to use less drugs (10.92 versus 8.64 percent). Users of other drugs more frequently were advised by health workers that they should reduce use of drugs (6.32 versus 8.64 percent), and a higher proportion reported that their parents thought that they used drugs too frequently (1.14 versus 1.64 percent). No significant differences at $p <= .05$ were observed in the number of problems reported by the two groups.

One of the variables usually associated with solvent abuse is antisocial behavior. Without intending to establish causal relations, the association between both behaviors was analyzed in the last school survey using the sample from Mexico City. Results are shown in table 10. The first two columns compare inhalers with users of illegal drugs, including illicit use of medical drugs. The third and fourth columns show rates reported by users of cocaine and by those students who have used only medical drugs without prescription.

As can be seen, inhalers present more antisocial behavior. They are more similar to cocaine users than to those students who have never inhaled or ingested illegal drugs. Inhalers more often steal, while cocaine users present more violent behavior and get involved in selling drugs more often than inhalers.

Another variable studied was depression, as measured by the adolescent 23-item version of the CESD-A, a depression scale developed by Roberts (1980). This version had been tested previously among Mexican students with satisfactory reliability coefficients (Mariño et al., in press). Drug users had significantly higher scores on depression than nonusers.[4] The measure also differentiates between nonusers, experimenters, and regular users.[5] However. no differences were found between inhalant abusers

TABLE 10. *National School Survey: Comparison of antisocial behavior between inhalant users versus users of other drugs (Mexico City).*

	Inhalant users %	Users of other drugs %	Cocaine %	Only illicit use of medical drugs %
Car theft	16.77	15.81	26.45	12.70
Theft: Less than $8	26.67	19.66	20.00	18.95
Theft: More than $8	16.36	9.01	11.76	3.17
Property break-in	9.76	4.29	14.71	5.29
Theft of merchandise	32.74	23.61	26.47	27.89
Armed robbery	4.85	3.02	11.76	3.17
Property damage	34.34	24.14	29.4 1	26.23
Arson	9.70	4.70	20.59	4.23

TABLE 10. *National School Survey: Comparison of antisocial behavior between inhalant users versus users of other drugs (Mexico City) (continued).*

	Inhalant users %	Users of other drugs %	Cocaine %	Only illicit use of medical drugs %
Assault	29.52	20.5 1	34.29	22.51
Involved in fights	41.32	31.06	34.29	22.51
Assault against teachers	6.67	3.86	8.82	3.17
Sellmarijuana	4.24	2.15	8.82	2.65
Sell other drugs	4.22	1.29	8.82	1.59

TABLE 10. *National School Survey: Comparison of antisocial behavior between inhalant users versus users of other drugs (Mexico City) (continued).*

	Inhalant users %	Users of other drugs %	Cocaine %	Only illicit use of medical drugs %
Total score				
X	17.61*	5.69	17.76	NO
S	7.83	0.76	7.94	NO

NOTE: * p <= 0.05

SOURCE: Medina-Mora et al. (1993).

and those students and drug users who had never used inhalants.[6] A tendency also was observed for inhalant abusers to experience appetite loss and for users of other drugs to feel sad and depressed.

According to the coroner's office, solvents were involved in 4.5 percent of violent deaths that occurred in Mexico City in 1990, with a rate of 4 males per female. Forty-one percent of the 318 suicides registered in that same year were drug related. In 10 percent of all drug-related suicides, inhalants were involved. Drugs also were involved in 25 percent of the 948 sudden death cases. Among all drug-related sudden deaths, 14 percent were related to solvents. According to SISVEA, intoxication with inhalants was registered in 9.3 percent of traffic accidents, in 1.2 percent of fatal job-related accidents, in 13 percent of home accidents, and in 32 percent of street accidents (Secretaria de Salud 1992).

PREVENTIVE INTERVENTION AND TREATMENT

Prevention of drug use has been an interest of different institutions. The Centro de Integracion Juvenil (CIJ), a private organization with 24 years of experience in the field, has undertaken major responsibility. CIJ's orientation mainly is educative, and the basic principles of their program are health oriented. The institution also provides primary preventive services to individuals ages 10 to 54 years at 4 stages in their lives: (1) childhood; (2) adolescence; (3) young adulthood/early parenthood; and (4) middle age/parenthood of teenagers, or adults who are in contact with teenagers through their offspring or profession (Cabrera et al. 1992).

Other efforts have been undertaken by governmental organizations and NGOs. Though schools always have been subject to programs coordinated by health and justice sectors, it was not until the establishment of the CIJ that a unique program oriented toward value clarification and health promotion came into existence.

Several institutions provide treatment for drug addicts in Mexico. The Social Welfare System has services and programs for drug addicts. Within the health system, hospitals, community health services, and emergency rooms provide treatment regulated by guidelines. These institutions usually are very busy attending to the health needs of a large population with scarce resources and no outreach programs. Drug addicts more often are treated in specialized centers and self-help groups.

The longest running institution, the CIJ, has been providing treatment for the last 24 years. The CIJ has 48 units distributed throughout the Mexican Republic, 2 of them for inpatients. Inhalant abusers are the most often treated clients after marijuana abusers.

Many governmental organizations and NGOs throughout the country have become interested in providing services to people with drug problems. At least 50 organizations are registered with SINTRA.

The government in Mexico City opened detoxification centers in 1990 that included followup and treatment for addicts; the centers are located in different strategic areas of the city. Traditionally, these services were provided in large trauma hospitals but, since the police investigate all admissions related to violence, addicts did not use these facilities. In 1991, the new facilities provided services to 708 drug users; 39 percent of them were inhalers. In 1992, 787 cases were admitted, 19 percent being inhalers.

Self-help groups play an important role in the treatment of drug abuse problems. Alcoholics Anonymous (AA) appeared as an alternative treatment for the Spanish-speaking population of the country in the late 1960s. It is estimated that, up to 1990, there were approximately 13,000 AA groups in Mexico, with an average of 22 members each. This represented a total of 286,000 AA members in the country. It is estimated that 5 in 1,000 Mexicans above 15 years of age are AA members, and it is believed that the rate of annual increase in membership is 10 percent (Rosovsky et al. 1992). A recent trend indicates an increase of young people becoming members, who, according to the older members, have not reached bottom. This increase coincided with an increase in the use of other substances. Rosovsky and colleagues (1992) found that 50 percent of a representative sample of registered groups in Mexico City also had used drugs other than alcohol and that 12 percent had used inhalants. Many drug addicts attended AA meetings either because they felt that alcohol was their main drug problem or because they felt comfortable in the group. The group is often selected in terms of age and sociocultural preferences.

There has been a recent increase in alternatives related to the treatment of other addictions, such as Narcotics Anonymous (NA). In Mexico City, 11 groups are registered with NA; the average membership per group is 60 persons, and the most common drugs of abuse are inhalants and marijuana.

Unfortunately, the type of attention provided by treatment institutions in the country is segmented in nature; that is, there are hospitals where the addict is detoxicated, other institutions where pharmacological and psychiatric treatment is provided, and so on. At the moment, no referral system is in place, with the result that addicts receive the treatment of the facility in which they are placed instead of treatment tailored to patients' needs. Efforts now are being made to address this situation.

PROGRAMS FOR STREET CHILDREN

The phenomenon of working children has been a major problem in Mexico City and other urban areas of the country. Through the years, various efforts have been made to address the needs of these minors. These children include both "children of the street" (children who live in the streets) and "children in the street" (children who, though living within the families, work in the streets). The first documented program for children working in the streets that included as a concern the prevention of inhalations of substances was begun in the 1970s.

At this time, the Mexican Center on Studies of Drug Abuse (CEMEF) (Leal et al. 1977) conducted longitudinal research of minors who made their living in the streets (i.e., children of the street) in a sector of Mexico City traditionally known for the high prevalence of violence and delinquency. The research included a component of treatment evaluation coordinated by CIJ (Leal and Pacheco 1988) that was based on principles of self-determination and token economy. Children were motivated to stop inhaling and to use their incomes to improve their living conditions.

Other research protocols undertaken by CEMEF and later by the IMP, in collaboration with the National University, evaluated residential and nonresidential treatment alternatives for inhalers based on social learning theory (Ayala et al. 1981; Mata 1984).

Governmental organizations traditionally have offered institutionalized housing for children who for one reason or another cannot live with their families. They provide housing and school for sons of prisoners, victims of abuse, and street children. The last type usually are institutionalized against their will, convinced by workers, picked up by special cars during the night, or taken by the police. It is common for them to run away.

Several programs have been developed for children over the years. In the mid- 1970s the government of Mexico City founded a program that included a special house for children (for both children in the street and of the street) that had no antecedents. This program proposed that these children could be rehabilitated before becoming part of the street subculture and that placement of the children in existing institutions would put them in contact with the street culture. An evaluation of children living in the two types of houses differed in many aspects, inhalation of substances being a major difference. Only 37 percent of the first type of minors exhibited the behavior, in contrast to 75 percent of the minors living in traditional institutions (Caudillo 1982).

NGOs also play an important role in the care of these children. Most NGOs are religious organizations and can be characterized as "closed-door institutions." Some of these programs provide food and care for street children as a nonresidential service. Children then are offered the opportunity to enter the residential program. These institutions have staff known as street educators, who interact with the children in their working and living environments. They gradually try to convince the children to get involved in the programs.

Though institutionalization has been the traditional response to the drug abuse problem, new alternatives have emerged since the 1980s. Deeper understanding of needs of the street children has resulted in a new type of program called open-door institutions. The role of international organizations such as the United Nations International Children's Emergency Fund, International Labor Organization, CHILD HOPE, and Sweden Action for Infant Development of Mexico and Central America has been of major importance. These types of programs are offered by governmental organizations and NGOs and provide services such as offering children places where they can go to eat, sleep, or participate in recreational activities. Children are free to enter and leave as they desire but must observe rules that include curfews, no fighting, and no use of drugs inside the facilities (Gutierrez et al. 1993).

METHODOLOGICAL ISSUES

Drug abuse epidemiologic research was initiated formally in the beginning of the 1970s with the establishment of CEMEF, an organization founded by the Government; the organization later became the IMP. The research strategy followed has included the development

and testing of validity and reliability of instruments and methodological approaches for the study of drug abuse. Various methods were developed and used to study different populations and different aspects of the problem.

The first drug abuse epidemiologic surveys were conducted in the 1970s. School-based surveys, studies among imprisoned populations, and studies with an anthropological emphasis included solvents among the substances investigated. At this same time, a national network of specialized treatment centers, CIJ, were started. Thus, statistics from patients in treatment have been available since then.

Three national school surveys have been undertaken, one in 1976 (Chao and Castro 1976), one in 1985 (Castro et al. 1986), and most recently in 1993 (Medina-Mora et al. 1993). The first two were conducted in urban cities, and the most recent is the first that includes both rural and urban populations and provides data statewide. Biannual studies also have been conducted in Mexico City since 1976.

In 1974, the first household survey was conducted in Mexico City and, through 1986, six other cities have been included. In 1986, a national household survey was undertaken among urban populations of the country by the DGE and the IMP (Medina-Mora et al 1989; Tapia et al. 1990). Also during that year, the Ministry of Health conducted the second national household survey. Epidemiologic studies with an anthropological emphasis focused on the social and cultural problems related to drug use and the rates of use among hidden populations and among children working on the streets.

In 1987, Ortíz and colleagues (1993) initiated a drug abuse reporting system (SRID) that has been in operation since that time and has collected data on 5,098 drug users. This system has provided the capacity to monitor trends in the problem and has served as an early warning system. During a 2-month period each year, it gathers information on antecedents of drug use among all populations in 44 health and justice institutions, regardless of the subjects' reason for entering the institutions.

In 1990, the DGE developed SISVEA and, in 1992, CONADIC developed a register of cases in treatment called SINTRA.

Thus, substance abuse research has a lengthy history in Mexico, and solvents always have been included as a drug of concern. More research is needed among high-risk groups in cities outside of the capital, where most research efforts and funds have concentrated. It also is important to standardize core items to be used in the protocols to allow comparability of data. Major efforts have been made to maintain comparability through the adoption of core items proposed by WHO (Hughes et al. 1980; Smart et al. 1980). However, the most recent surveys will not be strictly comparable to what has been produced by different institutions in the country in the previous 20 years.

HEALTH AND SOCIAL POLICIES

Substances with psychotropic effects that have no therapeutic use and commonly are used in industry are viewed as a separate group of volatile solvents[7] in the health laws—at least since 1973—and continue to be regulated in the National Health Law of 1984. It is stated that their use needs to be authorized and regulated by the Ministry of Health. Several regulations have been developed that mainly are aimed at protecting workers, and these are well implemented in the industry. However, a problem still remains with familial industries. Other regulations include restrictions of the type of substances that may be contained in end products that are subject to abuse, their packaging, and commercialization. The end products that contain these substances should have a warning label, and their sale to minors under 18 years of age is restricted.

Several drug programs also have been implemented in the past to address substance abuse in the country. The most comprehensive ones were established in the last decade. Since 1986, the Ministry of Health has coordinated a National Program Against Addictions that includes three levels of prevention carried out through CONADIC and State Councils. These councils were formed by representatives from the different sectors of the Government, as well as from the social and private sectors. Contributions of each sector were integrated into the National Program Against Addictions. It contains actions for control of both availability and demand at the three levels of prevention including: (1) control and regulation of availability; (2) prevention of use and of risks associated with the use in circumstances that endanger the individual or the society; (3) measures oriented to increasing the awareness of the population of the importance of the preventive measures proposed through programs of

social communication; (4) education and community participation; (5) early identification, treatment and, rehabilitation; and (6) epidemiologic surveillance, basic clinical and social research, evaluation of the program, and training of human resources.

The justice sector also has been active in addressing the problem. In the mid-1980s, the Attorney General's Office created a prevention program that included health and justice actions. This included detection and prosecution of drug dealers, as well as education and health initiatives. Different institutions were invited to participate, and actions were coordinated through an organization called Attention Program for the Drug Dependence of the Attorney General's Office (ADEFAR).

During a former administration, a new program for drug control was developed. It was coordinated by the Attorney General's Office and included supply and demand reduction components. All institutions reported their activities to the coordinators of this program. More recently, a new Institute for Drug Control was established within this sector. It will coordinate actions against illegal supply of drugs and also will include actions against demand. It is not yet clear the role that solvents will be playing, as the Institute is mostly oriented toward the control of illegal drugs.

Inhalation of solvents is the subject of serious concern in all sectors of the Government. During the current administration, the government of the City of Mexico, with the participation of CONADIC, created a fund called FISI, a trust for stopping abuse of solvents and inhalants through the contributions of producers and importers of these substances. This fund supports research, establishes standards to protect the environment, and develops programs to prevent abuse of these substances. Basic, epidemiological, social, and clinical research is part of the research activities that this program supports.

NOTES

1. The head of the family is the person that provides the biggest proportion of family income.

2. This analysis was performed for data from Mexico City, dividing users in two groups: those who include inhalants among the drugs that they consume, and those who do not.

3. Alcohol and tobacco were not considered in this analysis.

4. $x = 45.97$, $s = 13.34$; $x = 38.84$, $s = 12.01$; $t = 9.46$, $p \geq .001$.

5. $x = 38.84$, $s = 12.01$; $x = 45.57$, $s = 12.95$; $x = 47.32$, $s = 14.56$; $F = 53.14$, $p \geq .001$.

6. $x = 46.28$, $s = 13.46$; $x = 45.29$, $s = 13.06$; $t = .68$; $gl = 313$; pNS.

7. Other drug groups include prohibited drugs and substances with therapeutic use for which regulations depend on the relative risk associated with its use.

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Epidemiology of Inhalant Abuse in Nigeria

Isidore Silas Obot

INTRODUCTION

Drug abuse research in Nigeria and other African countries began in earnest in the 1960s. From the beginning, research interest was focused on those drugs that were associated with mental health problems. Cannabis (Indian hemp) was the first of such drugs, as it became evident that high proportions of young people admitted into psychiatric hospitals had been abusing the drug (Asuni 1964; Lambo 1965). Using hospital admissions data as a measure, cannabis remains the most abused illicit drug today in Nigeria (Obot and Olaniyi 1991).

Other drugs soon joined what is now a long list of problem drugs in Nigeria. Stimulants (Oviasu 1976), alcohol (Obot 1992), benzodiazepines (Odejide 1982), and tobacco (Obot 1990) now are abused widely in the country and continue to attract the attention of researchers and prevention experts. In the early 1980s the country was awakened to the creeping scourge of trafficking in and abuse of heroin and cocaine. The prevalence of abuse of these drugs has continued to increase, as shown by hospital records (Obot and Olaniyi 1991). Today there hardly is any drug that is not abused by Nigerians, even though some substances have received little attention from researchers.

The inhalants fall into this group. Many of the early studies did not report any abuse of inhalants, even though there were suspicions that organic solvents were being abused by youths and people in some occupations. In a review of epidemiological studies conducted in Nigeria, Pela and Ebie (1982) stated that:

> The potential abuse of volatile solvents in some occupational groups, such as car mechanics, welders, artisans and petrol station attendants cannot be ruled out in view of their close contact with such substances and poor emission control regulations. The spread of volatile substances to the schools is a logical sequence, bearing in

> mind the fact that a sizeable number of the skilled labour force are young adults and adolescents (p. 94).

Not long after this observation, researchers began to show interest in inhalants and included this category of drugs in research questionnaires. A recent review reported some use of inhalants by undergraduates and added that:

> Because these substances are inexpensive or can be obtained free from home, the potential for their widespread use is high. There is a need to monitor the pattern of solvent use, especially since little is known about the effects of these substances [in the country] (Obot 1992, p. 437).

PREVALENCE OF INHALANT ABUSE IN NIGERIA

Adolescents

The earliest study showing more than a passing interest in inhalants was conducted by the International Council on Alcohol and Addictions (1988) in southern Nigeria. In this major survey of drug abuse, widespread experience with solvents in some cities was reported. Using a questionnaire designed for the study, respondents were asked whether they had "ever used" and whether they were currently using glue, petrol, or kerosene (as well as other drugs). What constituted current use was not specified, and data on this were not reported. Table 1 shows the extent of lifetime abuse of solvents and two other drugs commonly abused among students in secondary schools, More than two-thirds of the students were 16 years old or less.

Reported use of solvents is comparable to the abuse of cannabis in three of the four cities where the survey was carried out. Lifetime abuse of solvents in Lagos (the country's largest city and primary commercial center) was particularly high.[1] Because these figures refer to lifetime or "ever use" of the substances by adolescents, the extent of current use of solvents can be gleaned only from other studies conducted in recent years.

In a recent study by Odejide and colleagues (1993) at the National Drug Law Enforcement Agency Demand Reduction Unit, current use of

TABLE 1. *Lifetime prevalence of alcohol, cannabis, and solvent abuse among secondary school children in four southern Nigerian cities (values in percentages).*

	Enugu	Ibadan	Benin	Lagos
Alcohol	26.5	24.4	49.2	26.5
Cannabis	11.9	20.3	7.3	37.8
Solvents	9.8	22.9	2.7	35.7

SOURCE: International Council on Alcohol and Addictions (1988).

solvents was estimated to be 1.5 percent in a sample of 2,439 school children. More boys (1.1 percent) than girls (0.4 percent) were current users. Most of the children experimented with solvents before 10 years of age. A great majority of the respondents (78 percent) believed that solvents were harmful to users. Table 2 shows that similar proportions believed that cannabis (78.4 percent) and cocaine (78.9 percent) were harmful. The near equivalence of perceived harmfulness ratings may reflect a general reaction to the harmfulness of all psychoactive drugs.

TABLE 2. *Perceived harmfulness of cannabis, cocaine and solvents by Nigerian school children (values in percentages).*

	Cannabis	Cocaine	Solvents
Harmful	78.4	78.9	78.0
Not harmful	12.6	12.3	12.3
Maybe harmful	2.5	2.5	2.8
Don't know	6.5	6.3	6.9

SOURCE: Odejide et al. (1993).

Adults and Older Students

Inhalant abuse among undergraduates has been reported by Adelekan and colleagues (1992). In a survey conducted among 627 university students, lifetime use of solvents was 3.7 percent, and use in the past month was 1 percent. A survey of Nigerian students in the United States (most of whom were born and grew up in Nigeria) showed lifetime prevalence of 6.3 percent, use in the past year of 2.9 percent, and use in the past month of 2.1 percent.

Inhalant abuse in the general population has been reported in one study (International Council on Alcohol and Addictions 1988). The substances most frequently used were petrol, glue, and kerosene. Table 3 shows that, in the two cities where the study was conducted, lifetime use of these substances ranged from 2.3 percent (for glue) to 15.1 percent (for kerosene). In the report, the authors noted the "wide variation in the populations from the four centres that used solvents" (p. 16) but gave no reason for their observation. The explanation may lie in the suspicion mentioned earlier that the questions on inhalants were misunderstood by respondents, probably in one center more than the other.

TABLE 3. *Percent use of solvents in the general population of two cities (values in percentages).*

	Benin (N = 602)	Ibadan (N = 450)	Total (N = 1,052)
Petrol	0.5	14.0	6.3
Glue	0.0	5.3	2.3
Kerosene	2.6	31.8	15.1

SOURCE: International Council on Alcohol and Addictions (1988).

THE EFFECTS OF INHALANT ABUSE IN NIGERIA

One of the ways in which the abuse of inhalants or many other drugs comes to the attention of experts is through hospital admission records. That was the case with cannabis, stimulants, cocaine, and heroin in Nigeria. Few studies of clinical populations (usually involving the

review of patients records) make any reference to inhalant abuse. In one of these, a retrospective study was conducted of admissions into four major psychiatric hospitals in Nigeria for a period of 5 years (1984-1988) (Obot and Olaniyi 1991). Only one case of inhalant abuse was referred to specifically in the case files. This case involved a 16-year-old Muslim male student who was admitted into a university teaching hospital because of sniffing "liquids, petrol, gum, gas," as recorded in his file. He spent 68 days in treatment.

In another study of alcohol and drug-related admissions by Ohaeri and Odejide (1993), in which the records of 10,396 cases in 28 psychiatric hospitals were analyzed, only 20 admissions were attributed to the abuse of solvents. Fifteen of these were found in only one facility in the northern part of Nigeria.

A PILOT STUDY OF INHALANT ABUSE IN NIGERIA

From the foregoing, it is clear that, in the available literature on the abuse of inhalants in Nigeria, no studies have been conducted in the country on inhalant abuse only. The studies cited earlier were general drug abuse surveys with a few questions on inhalant (especially organic solvent) misuse.

It is not clear from these studies whether or not African youth sniff substances other than glue, petrol, kerosene, and sprays. It also is not clear from available studies if abuse of these substances refers to exposure to them by chance or in the course of normal activities or to conscious attempts to "get high" or "feel good." (Since many sources of inhalants are available at home and children come in contact with them, it is necessary to make this distinction in studies of inhalant abuse.) This also is relevant to surveys that seek information on the abuse of prescription drugs, where the distinction between use as prescribed or use without a doctor's prescription is necessary. In order to address these shortcomings, it is necessary to carry out a more detailed study focusing only on inhalants. The data being reported in this section are from a pilot study on secondary school students' knowledge about abuse of inhalants. Work on inhalant abuse among artisans, low-skilled workers, and other members of the population is still in progress.

Method

Participants. Participants were all students in 11th-grade classes in three selected secondary schools in Jos, Nigeria. One was a mission school, the second a Federal Government school, and the third a school run by the Nigerian army. The mission school was a boys' day school; the others were both coeducational and residential. A total of 184 students participated in the study, but five were dropped from the sample because of incomplete information. The final sample, therefore, was comprised of 179 students (139 males and 40 females) with an average age of 16 years.

Procedure. A questionnaire designed specifically for this study was given by a trained research assistant to the students to complete in their classrooms. Permission to conduct the study was granted by the principal of each school. Teachers were not involved in administering the questionnaires. No identification was required from the students. They were assured of anonymity, and the purpose of the study was explained to them. The question on abuse of inhalants emphasized sniffing or huffing of the listed substances to "get high" or "feel good." The substances were materials with volatile solvents, aerosols, and anesthetics. The list was compiled on the basis of prestudy findings and information from the literature.

Results

Table 4 shows the prevalence of inhalant abuse in the sample. One-quarter of the students had used some type of inhalants at least once in their lives; 13.4 percent had used in the past year, and 11.2 percent had used in the past month. Significantly more boys (19.3 percent) than girls (6.4 percent) had "ever used" inhalants (table 5).

The different types of inhalants used by those surveyed are listed in table 6. The most often used substances were shoe polish (16.2 percent), sprays (16.2 percent), petrol (13.4 percent), exhaust fumes (12.3 percent), and glue (10.6 percent). Average age at first use was 12.4 years; the earliest age at first use was 9 years.

The types of inhalants used in the past year and past month are shown in table 7. Petrol and sprays were the two inhalants most commonly used in the past month. Glue, sprays, and petrol were used almost equally in the past year.

TABLE 4. *Lifetime, annual, and current prevalence of inhalant use among selected Nigerian secondary school students.*

	No.	Percentage
Lifetime use	46	25.7
Use in past year	24	13.4
Use in past month	20	11.2

About one-quarter of the students in each individual school had used an inhalant on at least one occasion in their lives. Among these, only about one-half had used in the past year, and a little less had used in the past month, as shown in table 8. There were no significant statistical differences in the three categories of use among the three schools (using the x^2 test).

Among those who had "ever used" the drugs, the main sources were the home (32.6 percent) and friends (17.4 percent). Twenty-five (13.9 percent) of the students reported that their friends used inhalants, especially glue, petrol, and sprays, as shown in table 9.

TABLE 5. *Lifetime periods of inhalant use by gender among selected Nigerian secondary school students.**

	No.	Percentage
Male (N = 84)	24	19.3
Female (N = 40)	7	6.4

NOTE: * Data are from the two schools that had male and female students.

TABLE 6. *Types of substances inhaled by users during lifetime.*

Substance inhaled	No.	Percentage	
		Users (N = 46)	Overall (N = 179)
Glue	19	41.3	10.6
Petrol	24	52.2	13.4
Paint thinner	9	19.6	5.0
Lighter fluid	11	23.9	6.1
Exhaust fume	22	47.8	12.3
Sprays	29	63.0	16.2
Ether	8	17.4	4.4
Chloroform	13	28.2	7.2
Nitrous oxide	10	21.7	5.6
Shoe polish	29	63.0	16.2
Correcting fluid	12	26.1	6.7
Other (kerosene, etc.)	4	8.7	2.2

Opinions About the Use of Inhalants

Participants were asked in an open-ended question to describe any additional information they had on inhalants. Some of the responses are listed in table 10. Most statements referred to the reasons for taking inhalants and the effects experienced. Many students stated that inhalants were dangerous and should be avoided. Some called on the Nigerian Government to do something about controlling the availability of substances containing solvents.

TABLE 7. *Use of glue, petrol, and sprays in "past year" and "past month" by all respondents.*

Substance	Past year		Past month	
	No.	Percentage	No.	Percentage
Glue	15	8.4 (62.5)*	7	3.9 (35)
Petrol	15	8.4 (62.5)	14	7.8 (70)
Sprays	17	9.5 (70.8)	14	7.8 (70)

NOTE: * Figures in parentheses refer to percent of those who used in the past year (N = 24) or past month (N = 20).

USE OF INHALANTS IN OTHER AFRICAN COUNTRIES

The dearth of studies on inhalant abuse in Africa is not peculiar to Nigeria. In fact, compared to other African countries, the situation is much better in Nigeria. A search of the literature reveals the rarity of

TABLE 8. *Use of inhalants by type of school.*

Type of School	Ever use		Past year		Past month	
	No.	Percentage	No.	Percentage	No.	Percentage
Federal Government (N = 63)	15	23.8	7	11.1	5	7.9
Army (N=61)	17	27.9	9	14.7	7	11.5
Mission (N = 55)	14	25.4	8	14.5	8	14.5

TABLE 9. *Sources of drugs.*

	No.	Percentage
Home	15	32.6
Friends	8	17.4
Brother/sister	3	6.5
Other	9	19.6

NOTE: N = 46 (i.e., the total number of those who had ever used inhalants). Some did not indicate source of drug.

studies that *mention* the abuse of inhalants in other African countries, except South Africa.

One study conducted 10 years ago in Zambia included inhalants in the list of drugs in the questionnaire. In a survey of students in health institutions and technical and secondary schools, Haworth (1982) found that, out of 1,234 male and 602 female students, 13 percent and 5 percent, respectively, had used an inhalant at least once. Use in the past month was reported to be 1.5 percent and 1.2 percent, respectively. Three males (0.2 percent) used inhalants daily or nearly daily.

> Of the 198 males who used inhalants [in the past year], 86 percent sniffed petrol, 1.5 percent glue, 4 percent aerosols and 8.5 percent did not specify the substance used. Of the 39 females who used volatile solvents, 56 percent sniffed petrol, 15 percent glue, 2 percent used aerosol, and 25 percent did not specify which substance was used.

Only about 32 percent of the males and 42 percent of the females regarded inhalants as harmful. Most did not know that inhalants caused any harm to users. Similar responses were recorded for other drugs, including tobacco and alcohol.

TABLE 10. *Selected opinions about the use of inhalants.*

1. Most of these substances sometimes are sniffed by me when working with them.
2. Whenever I inhale them, I feel I am above everybody and I sometimes take my father's motorcycle and start riding it.
3. They really make you feel cool and nice; know what I mean?
4. People don't only sniff to get high but to copy friends and playmates.
5. It's sometimes enjoyable sniffing 'cause, when you are high, you're cool.
6. It makes me feel like I do when I am in low spirit.
7. I took it because I wanted to fight, and after I took it I felt I was strong and that I could fight anybody.
8. People usually take them in order to make them aggressive when there is a fight.
9. Glue makes some people not to be afraid. Also, robbers use it for courage.
10. In actuality these substances are harmful but good for young guys.
11. The last time my friend sniffed spray, she told me it worked (i.e., she felt high and behaved crazy).
12. Petrol specifically . . I have seen a friend sniff it, and he nearly passed out after a few minutes. He never did sniff again because he felt that day he was going to die. Later, it caused him a serious sickness that nearly finished him.
13. They are poisonous, bad for health and all that, but nevertheless they make you feel good and that's what matters.
14. Petrol—It was like hell the first time I took it and [I] will never take [it] again. Immediately after I took [it] my eyes and the whole head was heavy for some seconds, and then I regained my normal energy.
15. I would like to advise those who get courage from drugs to start working with their right senses because you will end up a loser if you go on taking drugs. NOTE: IT FEELS GOOD TO BE ONESELF.
16. These are all illiterate or local drugs. Why didn't you mention "coke"?

THE NEED FOR MORE RESEARCH ON INHALANT ABUSE

Because of the social and cultural factors that influence the abuse of drugs in general and inhalants in particular, it is likely that there are distinguishable differences in the patterns of inhalant abuse within Nigeria and between African countries. For example, in Nigeria, it seems that the abuse of inhalants (and stimulants) is more prevalent in the northern part of the country. Northern Nigeria predominantly is Muslim, while the South predominantly is Christian. There is need for research to shed more light on regional and cultural differences in drug abuse within the country.

Apart from this, there are many other unanswered questions concerning inhalant abuse that require research attention at present. What, for example, are the social and familial factors associated with inhalant abuse? Do adolescents who use organic solvents use them in combination with other drugs ? What are the consequences of inhalant abuse? Do young people in some occupations (e.g., vulcanizers and carpenters) abuse inhalants more than others? These questions should guide the direction of future research on inhalant abuse in Africa. In order to answer them satisfactorily, surveys of student populations will have to be supplemented with collaborative studies with special groups and the general populations in different regions of African countries.

PREVENTION AND TREATMENT OF INHALANT AND OTHER DRUG ABUSE

In general, the treatment of alcohol and other drug-dependent persons in Nigeria is fraught with problems. First, the availability of manpower and facilities is grossly inadequate. A survey by the World Health Organization (1991) of mental health practitioners and facilities in the country showed a total of 28 psychiatric care facilities with about 3,000 beds. Listed as staff in these facilities were 44 psychiatrists, 15 clinical psychologists, and 11 social workers. Even though most mental health care workers were involved in the management of drug-dependent persons, only three hospitals had special facilities for the treatment of these patients.

A more recent survey (Ohaeri and Odejide 1993) supports this picture of the lack of availability of psychiatric care facilities in Nigeria. In 28 facilities visited by the researchers (13 in the north and 15 in the south),

there were 10,396 admissions in 1989. Eleven psychiatrists and two clinical psychologists were responsible for treating the 4,436 patients admitted into northern hospitals; 37 psychiatrists and 18 clinical psychologists were responsible for 5,960 in the south.

The major limitation imposed by the dearth of qualified manpower is the inability to give sufficient individual attention to patients. Treatment centers around prescription of neuroleptics and administration of electroconvulsive therapy for a wide array of problems. Individual and group therapies are rare (Ikwuagwu et al. 1993; Ohaeri and Odejide 1993).

The second problem in the treatment of drug abuse in Nigeria is its historical association with psychiatric hospitals and, consequently, with "madness." For an average African, "madness" involves weird behaviors (e.g., walking naked) that normally do not accompany drug abuse. Because they generally are tolerant of and accommodating to minor behavioral deviations, alcoholism and other forms of drug abuse are not regarded as mental disorders (unless accompanied by frank psychotic reactions) (Obot 1989); hence, only very serious cases of drug abuse will be seen in psychiatric hospitals. This situation requires alternative treatment facilities, especially therapeutic communities (TCs) and other private initiatives, in order to avoid the stigma of "madness." At present, there is only one well-known TC in the country that handles all types of drug-dependence cases. There is hope that the number will increase in the immediate future, since nonprofit organizations are beginning to show interest in drug abuse treatment.

Another insufficiently explored area is the role of traditional healers and churches. There is continued hope by some experts that these areas may expand the limited scope of drug abuse treatment in Nigeria and other African countries, even though the roles they provide are only ancillary to the treatment process (Nzewi 1989).

Like treatment and rehabilitation, prevention is in the early stages of development. There is general acceptance by experts and policymakers that much more needs to be done in the area of prevention. The Government agency responsible for the prevention of drug abuse in Nigeria is the Demand Reduction Unit of the National Drug Law Enforcement Agency. As a unit within an agency devoted to interdiction and other supply reduction activities, it lacks the independence needed to develop a successful program and is faced with the problem of poor

funding. However, by encouraging the formation of drug-free clubs in secondary schools, the unit slowly is making its presence felt.

Private, nonprofit organizations also are involved in prevention. However, few have a well-coordinated program of activities. Most of their activities are sporadic and poorly funded. There are indications, though, that the situation will change in the near future, as more and more professionals with requisite training in public health and the behavioral sciences participate in prevention at the community level.

NOTE

1. These figures should be treated with caution. The authors of the report warn that many of the respondents may have misunderstood the question: "They appeared not to have appreciated that what was being asked was whether they had ever ingested these substances and not whether they had ever used them in other ways" (International Council on Alcohol and Addictions 1988, p. 14).

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Inhalants in Perú

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INTRODUCTION

Drug use and abuse is a problem that seems to haunt all societies. Every culture deals with mind-altering substances that allow people to escape routine life. Technology and continuous change, the loss of traditional values, and the economic and social marginality experienced by many have led to massive and dysfunctional drug use. It is within this changing world that heroin, cocaine, and synthetic substances have become increasingly available in the streets. This increased use of illicit substances has created serious public health problems with economic and geopolitical consequences. Many societies, sensing impending doom and anticipating social disintegration, have reacted in a frenzied fashion in trying to solve the drug problem. These approaches to the drug problem have been more akin to religious wars than to rational problem-solving.

BACKGROUND

The history of drugs and their relationship to society have been studied from a variety of viewpoints. The most serious approaches take into account multiple variables and try to place drug use patterns within the context of culture, analyzing the ways informal and formal controls, shared social representations, the media, and the State influence drug use (Bachman and Cope1 1989; Escohotado 1989; McKenna 1992; Musto 1973). More recently others even have tried to rethink the answers society has been giving to drug problems, considering alternatives to the current legal status of psychoactive substances (Benjamin and LeRoy Miller 1993; Trebach 1987).

In none of the comprehensive studies about drugs, however, do inhalants appear as a significant issue. This matter has been of interest to clinicians and scientists since the pioneering report on inhalant use and abuse published by Clinger and Johnson (1951). However, it was not until the late 1970s that a serious effort to understand inhalant abuse was undertaken systematically by drug abuse researchers (Crider and Rouse 1988; Sharp and Brehm 1980; Sharp and Carroll 1978). In Latin America, most of the investigations conducted into inhalant use and

abuse and their biomedical, social, and epidemiologic dimensions have been in Mexico, a country that has hosted international conferences about inhalant use and abuse as well as produced a considerable amount of scientific research (Chavailli-Arroyo et al. 1988; Contreras 1977). This is understandable given the fact that inhalants are, with marijuana, the most abused illicit psychoactive substance in that country (Chavailli-Arroyo et al. 1988).

Data concerning inhalant abuse in Peru will be presented in this chapter, including its epidemiology, public perceptions, and the actions that society has taken to cope with the consequences of inhalant abuse.

DRUG ABUSE IN PERÚ

Interest in drug use outside the medical community in Perú has developed fairly recently. Most likely, the initiatives concerning drug abuse research and prevention that began in the mid-1980s have more to do with the fact that Perú produces approximately 60 percent of the coca leaf available worldwide—a sociopolitical issue—with public health and epidemiologic consequences (Lerner 1991). Whatever the real motivations, Peruvians have become intensely concerned with the problem of drug abuse. Currently, a number of institutions are conducting research into the patterns of drug use, the effectiveness of public awareness campaigns, and the impact of prevention programs on the drug-using behaviors of Peruvians.

The first epidemiological study on drug use in Peru focused on collecting data on the alcohol-using behavior of individuals living in the capital, Lima (Carbajal et al. 1980). This study found that alcohol was the most consumed drug and that the illicit substances had low lifetime prevalences (i.e., 3.2 percent for marijuana and 1.2 percent for coca paste). More recently, Jutkowitz and colleagues (1987) conducted a nationwide household survey. Findings from this survey (shown in the following tables) were confirmed by another national survey (Ferrando 1990). Table 1 shows the very high lifetime prevalence of illicit or socially accepted psychoactive substances and the relatively low figures for illicit drugs.

TABLE 1. *Lifetime prevalence of drug use in Perú (values in percentages).*

Substance	Lifetime prevalence	
	1986	1988
Alcohol	87.2	83.5
Tobacco	67.4	57.2
Hypnotics	0.9	0.8
Stimulants	3.7	1.3
Marijuana	8.3	5.3
Hallucinogens	4.0	1.4
Inhalants	2.4	3.6
Coca paste	4.0	2.8
Cocaine hydrochloride	2.6	1.3

SOURCE: Ferrando (1990); Jutkowitz et al. (1987).

Although these two surveys had different methodologies, both sets of results suggest that lifetime prevalence of alcohol was much higher than that of the illicit psychoactive substances. Use of illicit drugs was almost negligible.

INHALANT ABUSE

Historically in Peru, anesthetics were the first inhalants to be consumed. During the 1930s the use of ether was widespread. Anecdotal reports suggest that ether was used during carnival celebrations by people in the streets and in private parties. The phenomenon, what was then called etheromania, although essentially an urban and middle class one, was considered sufficiently serious to trigger governmental reaction. In 1936, a law was passed to control the availability of the substance and its consumption (Castro de la Mata 1987). Today, the use of this type of inhalant has disappeared. The use of volatile nitrites—butyl and amyl

nitrites—is virtually unknown in the country, and aerosols rarely are used for psychoactive ends (Ferrando 1990).

From the late 1930s until the early 1980s inhalant consumption was of little interest to Peruvians. In the first household survey in Lima (Carbajal et al. 1980), use of inhalants was not even included in the questionnaire. Huamán and colleagues (unpublished manuscript) conducted the first study about inhalant use in Peru. The results from data collected from different schools in Lima indicated that inhalants were the third most used drug class after marijuana and coca paste.

However, it was not until the mid-1980s that more detailed information on the use of inhalants became available. The findings from the 1986 and 1988 National Household Surveys, as shown in table 1, provided extensive data on the use of inhalants in the general Peruvian population. The results suggest that inhalant abuse in Peru is rather low. However, the use is higher among youths ages 12 to 14, with 20 percent reporting lifetime use of inhalants. Other results from the survey suggest the age of initiation for inhalant abuse is the lowest of all psychoactive drugs including alcohol and tobacco (see table 2). According to Ferrando (1990), the difference in the lifetime prevalence from one survey to the other could be due to a lack of comparability more than to a real change. In any case, the numbers are rather modest. However, both surveys are consistent in that current use of inhalants is more prevalent among younger people. Twenty percent of those ages 12 to 14 who acknowledged having ever used the substances are current users, compared to 8 percent for other age categories. Both studies also clearly show that inhalants have the lowest age of initiation of all drugs, including alcohol and tobacco.

Other interesting findings from these two surveys suggest that the percentage of those users who inhale frequently has grown. “Frequently” was defined as use of inhalants between 10 and 99 times during a person’s lifetime. In the general population, 2.6 percent to 15.4 percent were frequent inhalant users, and 0.6 percent to 18.2 percent of those 12 to 19 years old were defined as frequent users. This increase particularly is evident for subjects aged 12 to 19, a group that shows a higher rate of use than the other age cohorts (see table 3).

TABLE 2. *Age of initiation of drug use.*

Substance	Age of initiation	
	1986	1988
Alcohol	16.8	17.3
Tobacco	16.8	17.8
Sedatives	19.1	22.3
Hypnotics	NA	19.9
Stimulants	NA	19.3
Marijuana	18.7	18.6
Hallucinogens	23.1	21.0
Inhalants	14.9	14.2
Coca paste	20.8	20.3
Cocaine hydrochloride	22.3	21 .0

SOURCE: Ferrando (1990); Jutkowitz et al. (1987).

Finally, the findings on gender differences suggest that inhalant abuse is more prevalent among men (3.6 percent in Ferrando [1993]) than women (1.6 percent). Data from these surveys also suggest that glue and gasoline are the most preferred substances used by inhalant users. The 1986 survey showed that 41 percent of inhalant users reported lifetime use of glue, and 29.6 percent reported lifetime use of gasoline. The lifetime rates for glue and gasoline use in 1988 were 55 percent and 35 percent, respectively. Of survey subjects who have ever tried these substances, 41 percent preferred glues in 1986, and that percentage rose to 55 percent in 1988. In 1986, 27.3 percent preferred gasoline and 35 percent preferred this substance in 1988.

TABLE 3. *Frequency of use of inhalants for the general population and for subjects aged 12-19, according to two national surveys.*

Number of times	General population		Subjects aged 12-19	
	1986	1988	1986	1988
Once or twice	59.1	40.3	60.8	30.6
3-5 times	25.6	37.0	25.7	48.3
6-9 times	10.4	3.4	10.2	2.0
10-99 times	2.6	15.4	0.6	18.2
> 100 times	2.3	3.9	2.7	0.9

SOURCE: Ferrando (1990); Jutkowitz et al. (1987).

Results from a number of school-based surveys suggest, as do the two most recent National Household Surveys, that young individuals are more likely to use inhalants than their older counterparts. Data from the 1992 and other school-based surveys sponsored by Peru's Ministry of Education provide the most recent results on the use of inhalants among youths aged 11 to 19 (see table 4).

Further results from the 1992 school-based survey suggest that inhalant use came third following alcohol and tobacco use and was higher than the use of other illicit drugs (table 5). Table 5 gives information about life prevalence and current use for different psychoactive substances. Again, numbers are relatively low, even for legal substances, and very low figures for illegal drugs. Nonetheless, it is clear that inhalants come third after alcohol and tobacco.

Some of the more salient findings about inhalant use among students who responded to the 1992 school-based survey were as follows:

- Males have higher lifetime use rates (4.4 percent) than females (2.7 percent). Of students who reported lifetime use of inhalants, 60 percent were males.

TABLE 4. *Lifetime prevalence of inhalant use among 11-to 19-year-olds (values in percentages).*

Age group	1986	1988	1988	1992
11-17	NA	NA	3.6	3.6
12-14	6.7	3.8	NA	NA
15-19	6.4	3.6	NA	NA

KEY: NA = not available.

NOTE: This table contains data from two separate studies in 1988.

SOURCE: Ferrando (1990, 1991*a*, 1992); Jutkowitz et al. (1987).

- Inhalants are the only psychoactive substances for which lifetime prevalence has an inverse relation to age. Peak use occurred among 13- and 14-year-olds in this survey, and it was lower for older teenagers (table 6).

- Inhalant use was found to be more prevalent in the highlands (sierra), where 4.4 percent of the population has used inhalants at least once in their lives. Nonetheless, half of lifetime inhalant users reside in Lima. This is a new trend because, in the Andean region, the only drug more prevalent at the national level is coca leaf (chewing it has been a cultural tradition for many centuries).

- Inhalants as a class of drugs have the lowest initiation age of all psychoactive substances—median age is 11.8 years—with a clear tendency for the youngest groups to begin use earlier (see table 7).

- Most of the subjects who reported inhalant use in the 30 days prior to the survey had used inhalants less than 3 days out of 30. Three percent of inhalant users asserted that they had consumed on a daily basis, compared to 3.6 percent for marijuana, 9 percent for cocaine, and 13.3 percent for coca paste. Persons 15-16 years old have the highest level of daily use (10.7 percent of current users).

TABLE 5. *Lifetime prevalence and current use among a school population, 1992 (values in percentages).*

Substance	Lifetime prevalence	Current use
Alcohol	57.4	28.3
Tobacco	39.3	22.2
Medicaments	1.1	0.5
Hallucinogens	0.3	0.1
Inhalants	3.6	1.2
Marijuana	2.6	1.4
Coca paste	1.2	0.5
Cocaine hydrochloride	0.6	0.3

SOURCE: Ferrando (1992).

- The majority of those subjects who used inhalants frequently claimed to have consumed "small amounts" of the substance. On the other hand, few inhalant users have tried to stop their habit, and most inhalant users (88 percent) do not use other drugs.

TABLE 6. *Lifetime prevalence and current use among a student population (values in percentages).*

Age group	Lifetime prevalence	Current use
11-12	2.6	0.7
13-14	4.0	1.7
15-16	3.8	1 .0
17-18	2.8	1.1

SOURCE: Ferrando (1992).

TABLE 7. *Age at first use of inhalants among student population.*

Age group	Average age of first use
1 l-12	10.3
13-14	11.2
15-16	12.6
17-18	13.5

- Students overwhelmingly use glues, with 76 percent preferring to use thokal, a specific glue product in Peru. Sixteen percent use gasoline, and 6 percent inhale thinners.

Other studies that focus on specific population groups such as that of street children suggest a picture much different from that found with the National Household or school-based surveys mentioned in this chapter:

A study conducted by Lock (1989), in which data were collected on a sample of children in juvenile detention centers, found that 38.7 percent of the juveniles tested positive for inhalant use. Another study by Claux and Villanueva (unpublished manuscript) on a cohort of 154 street children found that 25.3 percent of these youths reported lifetime use of inhalants. Similarly, an ethnography study conducted by Ferrando (unpublished manuscript) with street children in the cities of Tarapoto and Tingo Maria found high rates of inhalant abuse. The lifetime rate of inhalant abuse for children living in Tingo Maria was 49 percent and 37.5 percent for those living in Tarapoto. These rates of use of inhalants by youths were exceeded only by alcohol consumption rates. Further, data from information collected by field workers conducting a census of street children in Peru indicate that about 16 percent of these children were heavy inhalant users.

It appears that there are even higher inhalant abuse rates among children living on the streets, a much more vulnerable population than children working in the street but living at home. According to social workers

working with children living in the streets, almost 100 percent used inhalants on a daily basis (Zuchetti and Ordonez, personal communication, June 1993). Anecdotal observations made by street workers suggest that the primary reason that children use inhalants is to seek a sense of identification with each other, "to feel that they belong to a group." Many of these children usually cease inhalant use once they leave the street and return to their families or are sent to juvenile detention centers (Lucchini 1991).

Clearly, the data reported by these studies suggest that the problem of inhalant use is much higher among certain vulnerable populations in Perú. Although these findings are based on small nonrepresentative samples of youth, they suggest that Peru does have a serious inhalant use problem. For many of the high-risk populations, it is apparent that inhalants seem to be the drug of choice.

PERÚ'S RESPONSE TO THE INHALANT ABUSE PROBLEM

Peru's main concern with drug use focuses on the use of cocaine and its health consequences. The findings from recent public opinion surveys among both the general and student populations on the use of drugs, as shown in table 8, suggest that inhalant use is not considered to be a serious problem (Ferrando 1988, 1989, 1991*b*, 1993; Information and Education Center for the Prevention of Drug Abuse 1993). Other drugs such as coca paste, alcohol, and marijuana were considered to be more widely used. Given the opinion of Peruvians toward the consumption of inhalants, it is not surprising that the Government and private sector have done little to address this problem. Currently, there is no legislation that addresses the problem of inhalant abuse in Peru, and prevention education programs targeting inhalant abusers are nonexistent (Lemer 1991).

SUMMARY

In Perú, the prevalence and consequences of inhalant abuse appear to be low in the general population and high among marginalized children. Inhalant use ranks third in lifetime prevalence after alcohol and tobacco. Most of the use appears to be infrequent.

TABLE 8. *Most-consumed drugs according to public perception of Peruvians from various surveys (values in percentages).*

Substance	Public opinion 1987	Public opinion 1988	Opinion leaders 1990	Public opinion 1992	School children 1992
Coca paste	34.6	34.4	40.9	36.3	8.6
Alcohol	27.3	26.0	17.2	5.6	50.7
Marijuana	26.1	17.8	14.6	20.6	2.8
Cocaine	NA	12.9	20.0	20.3	3.0
Tobacco	NA	5.8	2.6	6.5	29.4
Inhalants	NA	NA	NA	8.5	3.4
Others	12.0	3.1	4.7	0.0	2.0

KEY: NA = not available.

SOURCE: Ferrando (1988, 1989, 1991*b*, 1992); Information and Education Center for the Prevention of Drug Abuse (1993).

Among marginalized children, that is, children working in the streets but living at home or children living in the street, the problem of inhalant abuse is a serious problem. Among children working in the streets but living at home, the lifetime prevalence rate for inhalant abuse is high, ranging from 15 to 45 percent depending on the study being cited. For children living in the streets, the use of inhalant is even more severe. As mentioned earlier in this chapter, most of these street children use inhalants on a daily basis.

The lack of research on the problem of inhalant abuse is a serious impediment to development of intervention programs and strategies to address this problem in Perú. Epidemiologic and ethnographic research on the nature and extent of inhalant abuse are obvious prerequisites to targeted treatment and preventive intervention programs. The urgent need for current and valid data is underscored by the unique vulnerability

of the youthful population at risk and the undisputed harm that results from chronic abuse of inhalants.

Nonetheless, it is important to mention several programs that work with street children. Some, such as the Information and Education Center for the Prevention of Drug Abuse, Generation, and Centro Integración de Menores en Abandono have shelters where street children are offered transition to a less marginal lifestyle. Teams of street educators provide the children with practical solutions and gain their confidence, as well as offer them alternative socialization experiences to help them survive the streets and avoid the often repressive and counterproductive environments typical of many institutions. Most of the children who go through these programs tend to abandon inhalant use as they mature out of street life.

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Volatile Substance Abuse in the United Kingdom

John Ramsey, Jennifer Taylor, H. Ross Anderson, and Robert J. Flanagan

INTRODUCTION

The deliberate misuse of volatile compounds by inhalation in order to achieve intoxication has been a major problem in the United Kingdom since the early 1980s. Commonly referred to as "glue sniffing" or "solvent abuse," the term "volatile substance abuse" (VSA) has now gained acceptance.

Volatile compounds were inhaled to achieve intoxication even before their anaesthetic properties were recognized. Pseudoscientific demonstrations of the intoxication caused by nitrous oxide inhalation were a common stage act in the mid-1800s both in Britain and in the United States. Diethyl ether and chloroform also were freely available at this time and were inhaled or ingested commonly as alcohol substitutes. Nagle (1968) has surveyed the history of abuse of the early anaesthetic agents. It was not until the review by Press and Done (1967) and the paper by Bass (1970) on sudden "sniffing" deaths that the true nature and magnitude of the modem problem in the United States came to the attention of more than a handful of pathologists and toxicologists.

In 1975, Joyce Watson first reported her experiences treating glue sniffers in Lanarkshire, Scotland (Watson 1975). In the late 1970s the United Kingdom's National Poisons Information Service received an increasing number of requests for information about VSA (Francis et al. 1982), and toxicology laboratories analyzed samples from several deaths that had resulted mainly from the abuse of adhesives containing toluene or typewriter correction fluids containing halogenated solvents. This led to the recognition that VSA was becoming a major problem in the United Kingdom. A multidisciplinary workshop was held at Guy's Hospital in 1981 to collate all available information. The results were reported by Volans and colleagues (1982). More importantly, a formal method of collecting VSA-related mortality data was established that addressed the shortcomings of the established methods (Anderson et al. 1982). Consequently, the United Kingdom has consistent mortality data from at

least as far back as 1983. However, the country does not have the benefit of national household survey data on drug-related issues paralleling that from the United States and countries influenced by the United States. The annual number of deaths from inhalant abuse in the United Kingdom has increased since 1983 by an average of 5.4 percent. In 1988, a second conference on VSA was held at Guy's Hospital to reassess the state of knowledge and make further recommendations (Flanagan et al. 1989). Currently, two to three deaths occur each week, mostly among adolescent males. There is a trend toward the misuse of products containing gases, predominantly butane (Esmail et al. 1992).

PRODUCTS ABUSED: GENERAL OBSERVATIONS

For a product to have potential for misuse by inhalation, it must contain a suitable volatile compound that is readily accessible and free from irrespirable contaminants. For example, aerosols with high propellant content meet criteria for misuse (e.g., PR Freeze Spray and deodorants), whereas those with low propellant content (e.g., shaving foam) do not. In the case of deodorants, the propellant can be separated from the active ingredient (usually aluminum chlorhydrate) by inverting the can so that the dip tube is in the gas phase, not the liquid (figure 1).

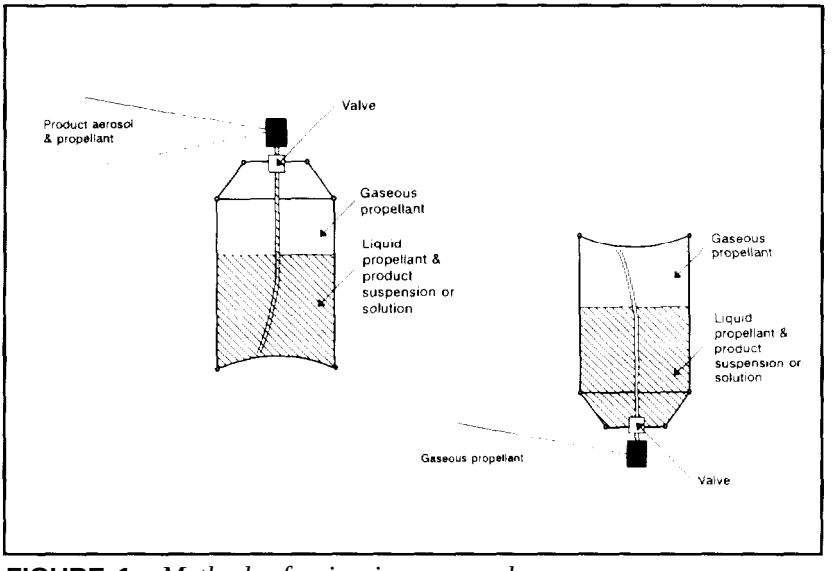

FIGURE 1. *Method of misusing aerosols.*

Therefore, to prevent misuse, a small modification to the valve could limit access to the propellant (D. Roberts, British Aerosol Manufacturers' Association, personal communication, 1990). Gas canisters that have a screw-on valve require the possession of an appliance to gain access to the contents.

Disposable cigarette lighter refills are attractive to misusers because the butane gas is accessible without use of an appliance. Anecdotal reports suggest that cigarette lighter refills most often are used by clenching the plastic nozzle between the teeth and pressing to release the gas. If the cylinder inadvertently is tipped up, very cold fluid (below -40°C) rather than gas is expelled. This can cause pulmonary edema or even death from vagal inhibition (Shepherd 1989). Modification of the valve on cigarette lighter refills should be considered to reduce this practice. Abuse of disposable cigarette lighters themselves, although often referred to, is unlikely because they contain very little gas (typically 4 ml of liquid) and the flow rate is restricted. The flammability of butane gives rise to the risk of bums resulting from misuse, usually when an intoxicated youngster decides to smoke and sniff butane at the same time (Scerri et al. 1992). Elliott (1991) reports cold bums (i.e., frostbite) of the mouth of a soldier who had inhaled a propellant containing propane and dichlorodifluoromethane (FC 12).

The international control of the manufacture of halogenated compounds suspected of depleting stratospheric ozone (table 1) will necessitate changes in the formulation of some products abused by inhalation. Typewriter correction fluids, as well as cleaning and degreasing agents, will no longer contain 1, 1, 1-trichloroethane, which is relatively safe during chronic occupational exposure. It can be expected that the more toxic trichloroethylene and, perhaps, dichloromethane will be substituted in some applications. On the positive side, bromochlorodifluoromethane (BCF, FC 12B1) probably will be replaced by carbon dioxide in fire extinguishers.

Based on mortality data and anecdotal reports, gasoline is not commonly misused in the United Kingdom, in contrast to the United States, where gasoline vied with glue as the top "ever used" product in the 1991 National Household Survey on Drug Abuse (Sharp 1992). It perhaps is more understandable that populations such as native Australians (Brady 1991) and the aboriginal populations of some other countries (Smart 1988), who do not have access to consumer products, should use this, the only readily available volatile compound. The hazard from lead additives

TABLE 1. *Phase-out schedule for ozone-depleting organochlorine, as agreed by the European Council of Ministers December 1992 and the Montreal Protocol.*

Substance	EC regulation		Montreal protocol	
	Cut by	Phased out by	Cut by	Phased out by
CFCs	85% by 1/1	1/1	75% by 1/1	1/1
Carbon tetrachloride	85% by 1/1	1/1	85% by 1/1	1/1
Halons	—	1/1	—	1/1
1, 1, 1-Trichloroethane	50% by 1/1	1/1	50% by 1/1	1/1

SOURCE: Department of the Environment, 2 Marsham Street, London (press release, January 1993).

(Edminster and Bayer 1985), at least in developed countries, now has been largely replaced by the unknown risk from compounds such as methyl tert-butyl ether, sometimes used as an octane enhancer in lead-free gasoline. The benzene concentration in unleaded gasoline typically is 3 percent volume/volume (v/v) but can be as high as 5 percent v/v (Wallace 1989), and benzene exposure carries a well-documented cancer risk (McMichael 1988; Wixtrom and Brown 1992). Brady (1991) makes the point that the hazard from lead in gasoline often is overemphasized to the exclusion of the toxic hydrocarbon components. Hall and colleagues (1986) attributed the profound motor neuropathy in a 4-year-old Sudanese child treated in Britain for the effects of gasoline misuse to the effects of *n*-hexane. Products formulated specifically for abuse are unknown in Britain, unlike the mixture of chloroform and ether popularly known as lança-perfume in Brazil (Carlini-Cotrim and Carlini 1988). Cans of whipped cream are not commonly abused in the United Kingdom, and no commercially produced paraphernalia to misuse them has been seen, However, at least one death has resulted from misuse of this product in the United Kingdom (Toseland and Cameron 1984).

UNITED KINGDOM VSA MORTALITY DATA COLLECTION METHOD

The United Kingdom death certification process and Coroner system lend themselves to gathering data on problems such as those posed by VSA. Death certificates are public documents and are available for study. In England and Wales, Her Majesty's Coroner must hold an inquest in all cases where he is informed that a dead body is lying in his jurisdiction and where he has reasonable cause to suspect violent or unnatural death or death from some unknown cause, or if that person has died in prison or in such a place or in circumstances in which an inquest is required by an Act of Parliament. A post mortem examination usually will be performed if the deceased has not seen a doctor for 14 days prior to death. All deaths in suspicious circumstances are investigated and, if not found to be from natural causes, an inquest is held. Toxicological analysis almost always is performed to confirm suspicion of a drug-related death. The Coroner's court is open to the public (and the press), except when privacy is desirable in the interest of national security; access to inquest proceedings is restricted to "properly interested persons." This includes those engaged in research for Government departments or research funded by Government departments. Witnesses give evidence under oath, and their attendance can be compelled. The procedure is

inquisitorial, unlike the procedure in ordinary courts of law. The Coroner can summon a jury in most cases. Scotland has its own legal system and a different officer, the Procurator Fiscal, who is responsible for death investigation. Northern Ireland has a system similar to that of England and Wales. The Channel Islands and the Isle of Man have yet other systems but have very small populations.

The difficulty in collecting data on VSA-related deaths by conventional methods arises not only from the many volatile compounds and products that may be abused, thus causing death, but also from the many possible circumstances leading to death. Consequently, analysis of death data coded using International Classification of Diseases codes usually results in a gross underestimation of the problem. There are several reasons for this, among which are the lack of mention on some death certificates of the substance responsible and the variety of codes to which deaths may be assigned (Anderson et al. 1982). However, Coroners now are advised that an appropriate verdict is "death by solvent abuse" or something similar, rather than the less informative one of death by drug abuse (R v. Inner South London Coroner (ex parte Kendall) [1989] 1 All ER 72, DC).

Since 1983, VSA-related mortality data have been collected at St. George's Hospital Medical School in the ways shown in figure 2 and listed on the following page.

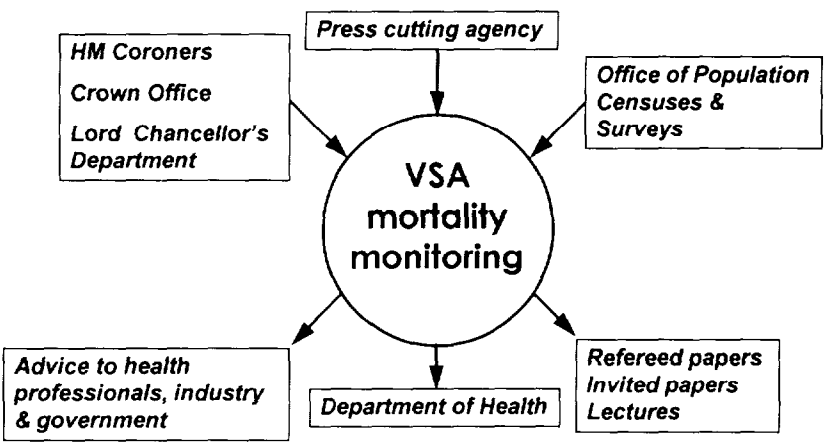

FIGURE 2. *United Kingdom VSA-related deaths: Data collection and dissemination methods.*

1. By subscription to a press clipping agency that monitors all British publications (national and local newspapers and magazines) and "abstracts" (i.e., clips) any mention of a VSA-related death;

2. By writing regularly to all 158 Coroners in England and Wales, the Crown Office in Scotland, and the Lord Chancellor's Department for Northern Ireland; and

3. By maintaining liaison with the Office of Population Censuses and Surveys (OPCS).

Press cuttings also are compared with the Institute for the Study of Drug Dependence (ISDD) and the British Aerosol Manufacturers' Association (BAMA), and there is liaison with the Health and Safety Executive and the Railways Inspectorate over deaths in the workplace. Newspaper reports are not used to provide detailed data but to indicate that a death has occurred and to provide the name of the deceased and the location. Details of the case then are obtained from the Coroner's office. Copies of the following are collected when available:

1. The inquest proceedings,
2. The pathologist's report,
3. The toxicology report, and
4. The death certificate.

Methods of data collection have been the same since 1983, although the data extends back to 1971. It is unlikely that deaths, particularly in teenagers, escape attention nowadays unless the facts deliberately are concealed. This is not impossible, though, since a family doctor can sign a death certificate without a post mortem examination under certain circumstances. However, because deaths from any cause are rare in teenagers, the OPCS can attach additional coding data manually ("associated digit" coding system). It perhaps is more difficult to be so confident about deaths among the older population, where VSA is less likely to be suspected. However, regular letters from St. George's Hospital Medical School to all Coroners should prompt them to keep the possibility in their minds.

UNITED KINGDOM VSA-RELATED MORTALITY DATA

Almost all the data on VSA in the United Kingdom come from mortality statistics (Taylor et al. 1993). There has been an increase from at least 2 deaths in 1971 to 122 in 1991, the last year for which data are available (figure 3). The highest number recorded in any one year was 151 in 1990. This represents an average annual increase of 5.4 percent from 1983 to 1991. Data on 1,237 VSA-related deaths occurring from 1971 to 1991 have been compiled in the United Kingdom.

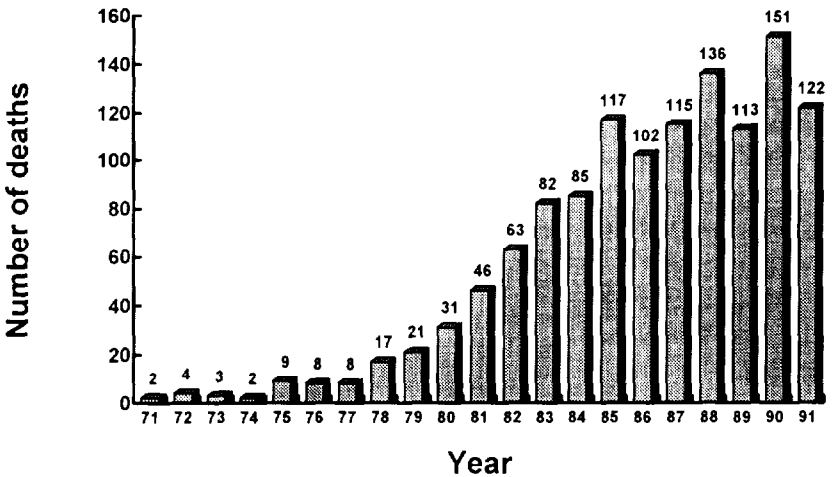

FIGURE 3. *United Kingdom VSA-relafed deaths: Deaths by year, 1971-1991 (N=1,237).*

Age at Death

The most common age at death by VSA is 15 or 16 years of age, with the youngest recorded at 9 and the oldest at 76 (figure 4). In all, 73.2 percent of deaths occurred in people who were under 20 years old. The age distribution is remarkably similar to that associated with the practice all over the world (see other chapters, this volume).

Sex

Eighty-eight percent of persons suffering VSA-related deaths are males. This finding has not changed significantly over the period for which data

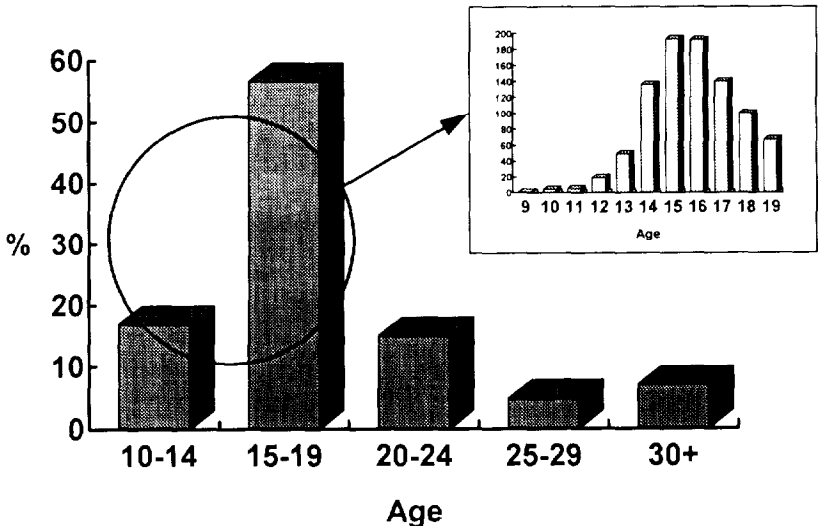

FIGURE 4. *United Kingdom VSA-related deaths: Age distribution of deaths, 1971-1990.*

are available. This phenomenon (i.e., the disproportionate number of males) is in marked contrast to the limited data available on the prevalence of use, which appears to have a more even sex distribution. This is discussed later in the chapter.

Regional Distribution

In the 10- to 24-year-old age group, from 1983 to 1991, Scotland had the highest rate—12.8 per million (95 percent confidence interval, 10.8-15.2), followed by the North of England at 11.0 (95 percent confidence interval, 8.6-14.0) and Northern Ireland at 10.8 (95 percent confidence interval, 7.9-14.8) (figure 5). This contrasts with rural East Anglia—3.2 (95 percent confidence interval, 2.3-6.3). Note, however, the wide confidence intervals associated with the relatively small numbers.

PRODUCTS RESPONSIBLE FOR VSA-RELATED DEATHS IN THE UNITED KINGDOM

Beauvais and Oetting (1987) argue that the anesthetic gases and alkyl nitrites should be excluded from consideration of VSA because of

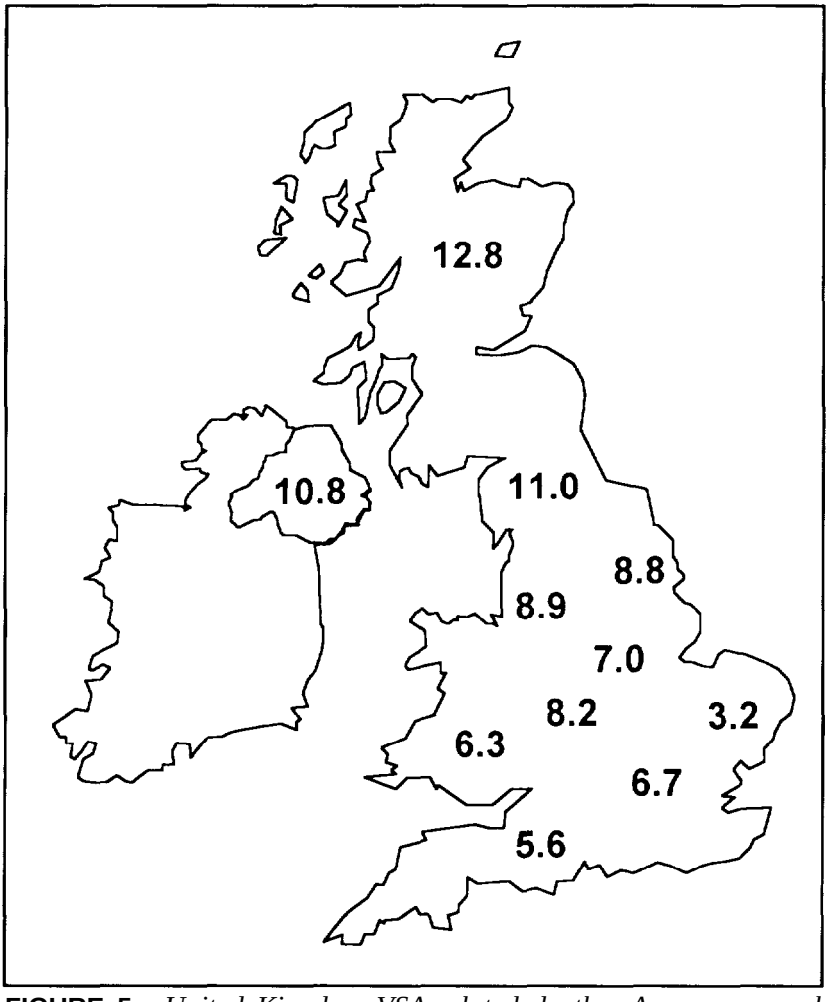

FIGURE 5. *United Kingdom VSA-related deaths: Average annual death rate per million, 1983-1991 (ages 10-24).*

differences in neurochemical actions and clinical profiles. Alkyl nitrites should be differentiated from compounds used for VSA for those reasons. However, they have been included here in order to emphasize the difference in mortality: Only 5 of 1,237 United Kingdom VSA-related deaths involve alkyl nitrites, all in males over 30 years old. However, no reason is apparent for exclusion of the volatile anesthetics since the mode of action is similar to the other compounds used in VSA. If this strategy were adopted, it would be difficult to decide whether to exclude trichloroethylene, chloroform, and diethyl ether, all of which have been

used as anesthetics. Nitrous oxide is used as a propellant as well as an anesthetic.

The alkyl nitrite products, often referred to as "poppers," most often contain isobutyl nitrite or isopentyl nitrite (i.e., "amyl nitrite"). They always contain many isomers, as well as alcohols from the breakdown of the nitrite esters. Mortality from nitrites, in the older population particularly, could be underreported because deaths often have an embarrassing erotic component (Gowitt and Hanzlick 1992), and the unchanged compounds cannot be detected in blood. However, the profound methemoglobinemia particularly from oral ingestion (not included in the mortality data) is confirmed readily in the laboratory (Pierce and Nielsen 1989). Surveys of inhalant use by schoolage children show very significant rates of experimentation with nitrites. One study among further education students (age 16 and over, taking academic or vocational courses) in the Wirral suggests use among 15-16 percent (Foley and Todhunter 1992); another on the remote rural island of Shetland (Shetland Health Board 1992) reports 9 percent. The nitrites also seem to have become part of the "dance drug" scene along with Ecstasy (i.e., methylenedioxyamphetamine, methylenedioxymethyl-amphetamine or methylenedioxyethylamphetamine) (Gallup 1992). The association of nitrite use with acquired immunodeficiency syndrome (AIDS) and Kaposi's sarcoma remains controversial (Haverkos 1990; Newell et al. 1988).

Products may be classified in one of the following ways:

1. *Fuel gases:* Abusers principally inhale butane from disposable cigarette lighter refills, but occasionally they use propane or butane from industrial or domestic use (e.g., mobile home) (table 2). These gases are produced either from natural gas fields or from the catalytic cracking of higher petroleum products. They contain many compounds depending on the source but mainly consist of methane, ethane, propane, *n*-butane, and isobutane. There is no requirement to purify these products for their legitimate (fuel) use, and 1, 3-butadiene may occur legally at concentrations up to 1.0 percent v/v at present. 1, 3-butadiene is strongly suspected to be a human carcinogen (Bird 1990). Stenching agents, such as tetrahydrothiophene (THT), ethyl mercaptan, or dimethyl sulphide are added in order to make leaks in supply systems more readily apparent. These may give rise to toxicity if the product is deliberately inhaled. One manufacturer is

TABLE 2. *United Kingdom VSA-related deaths from gas fuels.*

Product	Deaths
Cigarette lighter refills (butane)	347
Domestic gas (butane)	56
Propane	8
Acetylene	2
Natural gas (methane)	1
Unspecified gas	15
Total	**429**

replacing the more toxic ethyl mercaptan at about 20 ppm with the less odorous but less toxic THT at 70 ppm, (D. Morse, Shell Gas, personal communication, 1993).

2. *Aerosol products:* The propellants are the components that are misused, although some exposure to the other constituents is hard to avoid. Chlorofluorocarbons (CFCs), principally fluorotrichloromethane (FC 11) and FC 12, were commonly used propellants at one time but have been phased out from most domestic products. The rate of removal has not been as rapid in all countries as in the United States (table 1). Some CFCs have been retained for medical use where suitable substitutes are not readily at hand. PR Freeze Spray (85 percent FC 11 and 15 percent FC 12) still is available in the United Kingdom as an over-the-counter medicine used to ease muscular pain and stiffness. It is readily abusable because it contains no ingredients apart from CFCs; it is encountered commonly in VSA fatalities (table 3). Although many other compounds are in development as potential propellants (Trochimowicz 1992), aerosol manufacturers worldwide have adopted butane as a practical substitute for CFCs despite its flammability. Butane used as a propellant is deodorized and is likely to contain only traces of 1, 3-butadiene. Some industrial aerosols and European domestic products contain dimethyl ether, often blended with chlorodifluoromethane (FC 22) to form a nonflammable azeotrope, as

propellant. In the United Kingdom, products with a high propellant content, principally deodorants, pain relief spray, and air fresheners, are preferred (table 3). There is a potential hazard from exposure to aluminum chlorhydrate in deodorants. Based on the mortality data, abuse of spray paint is rare in the United Kingdom, in marked contrast to the United States (Goodwin 1988; Streicher et al. 1981; Voigts and Kaufman 1983) and Japanese experience (Suwaki, this volume).

3. *Solvents from adhesives:* Contact adhesives containing toluene are responsible for most of the deaths from the abuse of glue in the United Kingdom (table 4). The adhesives contain many other volatile components in addition to toluene, which, although probably not responsible for intoxication, are important when assessing possible toxicity from chronic VSA.

4. *Other products:* A wide range of other products are misused (table 5). A major cause of death is misuse of typewriter correction fluid or its thinner, which once contained 1, 1, 1-trichloroethane. Abuse of fire extinguishers containing BCF is an important if highly

TABLE 3. *United Kingdom VSA-related deaths from aerosols.*

Product	Deaths
Deodorant	111
Pain relief spray	53
Air freshener	24
Hair spray	16
Cleaning fluid	12
Paint	5
Glue	3
Unspecified aerosol	27
Total	**255**

TABLE 4. *United Kingdom VSA-related deaths from adhesives.*

Product	Deaths
Contact adhesives	129
Bicycle tube repair cement	9
Model glue/plastic cement	3
Unspecified adhesive	94
Total	**235**

variable cause of death (figure 6). Anesthetics (predominantly nitrous oxide and halothane) and solvents used as cleaning or degreasing agents (1, 1, 1-trichloroethane, trichloroethylene, and tetrachloroethylene) are also responsible for deaths.

In summary, using the product classification above, abuse of gasoline fuels caused 35 percent of VSA deaths, other products caused 24 percent, aerosols caused 21 percent, and adhesives caused 19 percent, with only 1 percent of causes not known. A trend has been observed towards the misuse of the gaseous compounds in recent years (figure 7), particularly among the young (Esmail et al. 1992). Only five deaths have been directly attributed to the effects of alkyl nitrites.

CAUSE OF DEATH

It often is difficult to establish the precise mechanism of death related to VSA. Typically, a previously healthy teenager collapses while with friends, often at home. The paraphernalia of VSA, often the product and sometimes a plastic bag, is found by the body. Well-meaning friends or parents occasionally will tidy up the scene before an investigation. Usually at the post mortem examination, nothing remarkable is seen except perhaps acute congestion of the lungs, but the circumstances and the subsequent toxicology report lead to the conclusion that it was a sudden sniffing death. Knowing the arrythmogenic potential of the compounds, the pathologist reports that the death probably was due to a

TABLE 5. *United Kingdom VSA-related deaths from other products.*

Product	Deaths
Typewriter correction fluid	92
Fire extinguishers	49
Anesthetics	29
Petrol (gasoline)	18
Adhesive plaster remover	17
Dry cleaning fluids	16
Domestic cleaning fluids	15
Industrial solvents/degreasers	12
Carbon tetrachloride	10
Paint thinner/stripper	5
Alkyl nitrites	5
Unspecified	34
Total	**301**

fatal cardiac arrhythmia. The presence of vomitus (vomiting being a common terminal event) or a plastic bag sometimes leads to asphyxia appearing on the post mortem report. Faced with this sort of evidence, any analysis of the precise mechanism of death needs to be treated with caution (figure 8). However, overall for the gas fuels, aerosols, and other products, about 20 percent of deaths involve inhalation of vomit, about 15 percent are associated with a plastic bag, around 60 percent are attributed to direct toxic effects (arrhythmia?), and only 5 percent involve trauma. In contrast, 40 percent of deaths from adhesives are from trauma, and only 20 percent are from direct toxic effects. Sometimes suicide can be attributed to a change in mental state caused by VSA. Cases where a volatile compound is used merely as an agent to cause death are excluded.

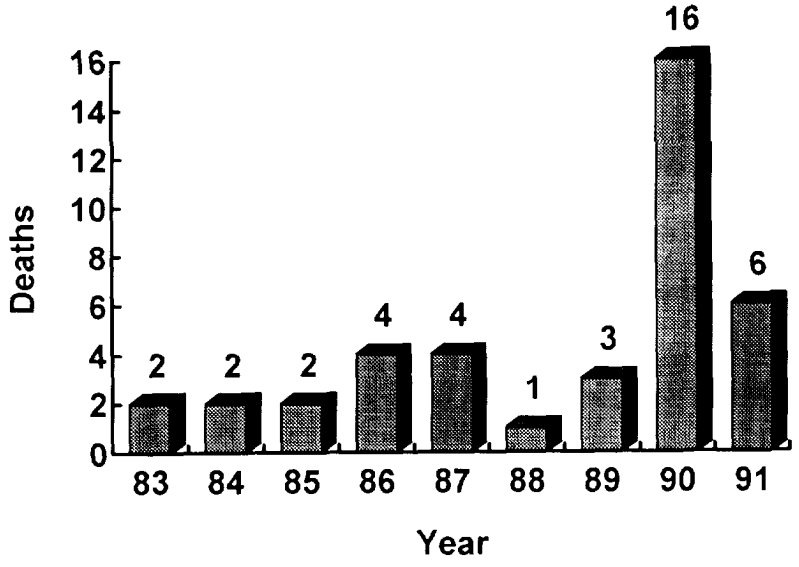

FIGURE 6. *United Kingdom VSA-related deaths: Fire extinguisher deaths.*

PRIOR USE

In only about 70 percent of United Kingdom VSA-related deaths is there evidence of prior VSA, but care needs to be taken when interpreting this finding. At the inquest the friends and family often deny any knowledge

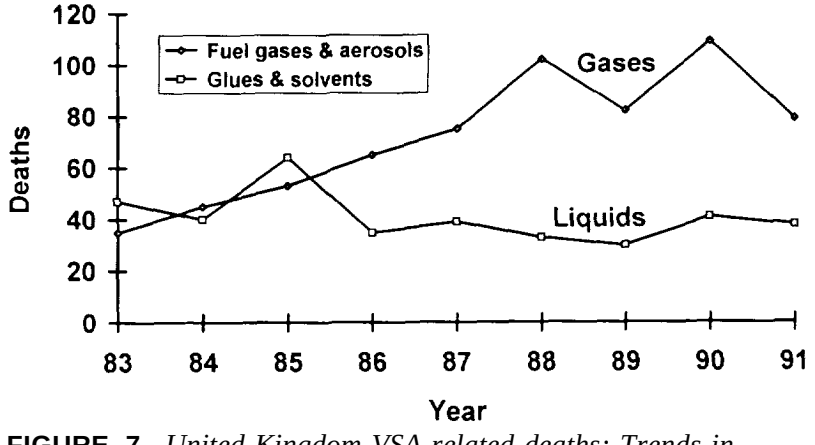

FIGURE 7. *United Kingdom VSA-related deaths: Trends in products causing death.*

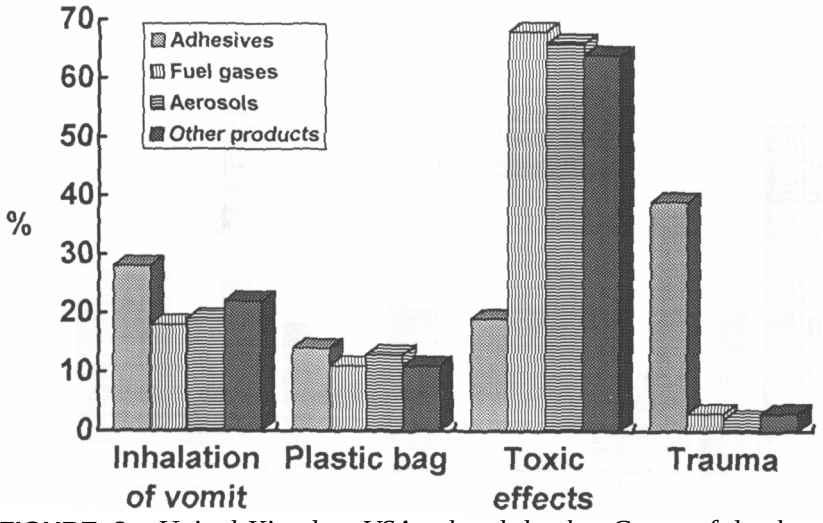

FIGURE 8. *United Kingdom VSA-related deaths: Cause of death by product.*

of prior VSA by the deceased, and the Coroner may not press the question for humanitarian reasons. The primary purpose of the inquest is to exclude crime rather than to establish the exact circumstances of death. In the remainder of deaths (i.e., 30 percent), there is no evidence of prior use, and some of these may be naive users who have succumbed due to inexperience. It must be difficult, particularly when using very volatile and short-acting compounds (like gases), to titrate the "high" against the dose. The risk of accidental overdose also is greater with the gaseous compounds. When liquid solvents and solvent-containing products are abused, the vapor inhaled always will contain air, but with gases it is easy to displace all air, thus adding anoxia to the hazard. For most other drugs of abuse, there is some indication of dose. Even street drugs such as cocaine and heroin tend to be sold in single dose units at the user level. In contrast, a teenager given a cigarette lighter refill has to either experiment or be taught by his or her peers to find out if one sniff or half a can is required to achieve the desired effect. One can imagine that this is a very risky process.

METHODS OF MISUSE

The method of misuse is related to the nature of the product (figure 9) Adhesives commonly are poured into a plastic bag, and the vapor is inhaled from the gathered neck of the bag.

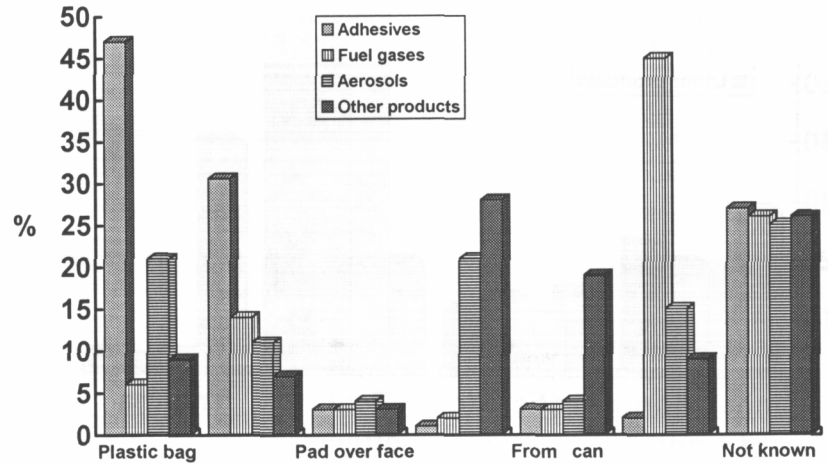

FIGURE 9. *United Kingdom VSA-related deaths: Method of misuse by product.*

Contact of the perioral region with adhesive contaminating the bag probably is responsible for "glue sniffers rash" (Meredith et al. 1989). Liquids commonly are inhaled directly from the original containers or poured into empty containers such as bleach bottles before use. It probably is observation of this practice by adults that gives rise to many rumors of bleach sniffing. However, this bizarre practice has been documented (Raferty 1980). Vapor from liquids also may be inhaled after pouring them onto a handkerchief or sleeve. Aerosols sometimes are inverted and sprayed directly into the mouth (figure 1), used to inflate plastic bags, or, more rarely, bubbled through water to scrub out the nonrespirable components. Deaths have occurred when children have done this in the bath; the semiconscious child falls forward and drowns. Cigarette lighter refills are misused by clenching the nozzle between the teeth, and pressing on the can to discharge the contents directly into the mouth, as discussed above.

PLACES WHERE SUBSTANCES ARE ABUSED

In 1991, 39 percent of VSA-related deaths occurred when sniffing took place at home; 11 percent at the home of a friend; 3 percent in an institution (e.g., school or residential home): 42 percent in a public place; and 2 percent at work. The location was not reported in 3 percent of cases (figure 10). It perhaps is surprising that over half of the deaths

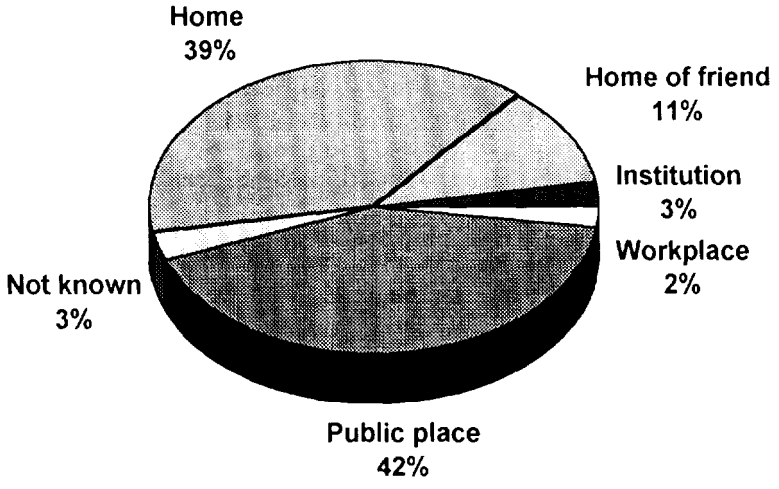

FIGURE 10. *United Kingdom VSA-related deaths: Place where substances abused.*

occurred in circumstances where one might have expected some form of supervision. Almost all were dead before arrival at the hospital.

PREVALENCE OF VSA IN THE UNITED KINGDOM

There is no systematic data collection mechanism in the United Kingdom equivalent to the United States' National Household Survey on Drug Abuse or the Drug Abuse Warning Network. In 1993, the ISDD published the third National Audit of Drug Misuse in Britain (Institute for the Study of Drug Dependence 1993). To quote the introduction: "Strong public and official concern over the use of these substances *(drugs of abuse)* is not matched by a system capable of effectively monitoring how concerned we should be—how big the problem is. Instead, it is a case of divining a pattern in mismatched bits of information from various and disparate sources." Although a General Household Survey is conducted in the United Kingdom on a continuous basis, it asks only about tobacco and alcohol use. The OPCS estimated that a sample of around 20,000 people aged 11 and over would be required to survey drug use nationally, but this has not been attempted (Goddard 1987). Consequently, no systematic longitudinal data are available but only a series of surveys, mostly local and using nonstandardized methods.

NATIONAL VSA STATISTICS

The only official United Kingdom drug misuse statistics available are from notifications to the Home Office of opiate and cocaine addicts seen by doctors (Home Office 1992), as well as convictions and seizure data from law enforcement agencies (Home Office Research and Statistics Department 1991). Neither of these is relevant to VSA. There are some ad hoc national surveys, such as the 1982 British Crime Survey (Anonymous 1982), which consisted of face-to-face interviews conducted in the home with 16,000 people aged 16 and over. This was repeated in 1984, with a revised protocol that did not include VSA.

Table 6 presents prevalence rates for VSA from several surveys:

In 1992, a survey of 625 youngsters aged 15-24 (Gallup 1992) reported a prevalence of VSA of 4-10 percent. In 1990, a household survey of 4,436 people aged 16-19 (Market and Opinion Research International 1992) reported 4 percent prevalence of VSA for males and 2 percent for females. A school-based survey of 9- to 15-year-olds (Market and Opinion Research International 1989) gave a 3-percent VSA rate for males and 1 percent for females; analysis by age showed no clear pattern, but boys rated consistently higher than girls. The rate among Asians was highest at 3 percent, with 2 percent for Caucasians and 1 percent for Afro-Caribbeans.

Surveys at the homes of 13- to 20-year-olds, carried out as part of an evaluation of Government health education campaigns, found less than 1 percent VSA (RBL 1989), but these surveys may have produced low results because they are thought to have been carried out when a parent was present. The comprehensive questionnaire-based studies of Balding (1993) on health and behavior of young people (18,407 people in 1988) are nonrepresentative of the general population, as schools elect to take part. Nevertheless, Balding (1993) reported 2 percent VSA in children aged 12-13, 6 percent in children aged 14-15, and 8 percent in children aged 15-16, with equal numbers of males and females. In an earlier survey, of 28,413 youngsters between 11 and 19 years of age, Balding (1989) reported 1.7 percent males and 2.1 percent females; and in a 1987 study of 15,071, Balding (1988) reported 1.5 percent total, with 2.5 percent of girls and 1.6 percent of boys in their fourth and fifth years of secondary education claiming to have used solvents. Coggans (1991), in a study of 1,200 pupils aged 13-16 in Scotland, reported 12 percent VSA in 1988. Audience Selection (1985) conducted a telephone survey and

TABLE 6. *National survey's giving prevalence of VSA in the United Kingdom.*

Survey	Type	Place	Year	N	Age range (yrs)	% VSA & sex
Gallup (1992), for Wrangler	Not known	Britain	1992	625	15-24	4-10%
Balding (1993)	Questionnaire school	Variable	1987-1991	23,928	11-16	2% 12-13 6% 14-15 8% 15-16 M = F
MORI Todays Young Adults, Health Education Authority	Household	England	1990	4,436	16-19	4% M 2% F
MORI Tomorrows Young Adults, Health Education	School	England	1989	10,293	9-15	3% M 1% F
RBL (1989), evaluation of Government campaigns	At home	England & Wales	1985-1989	720.00	13-20	0-1%

TABLE 6. *National surveys giving prevalence of VSA in the United Kingdom (continued).*

Survey	Type	Place	Year	N	Age range (yrs)	%VSA& sex
Balding (1989)	School	Variable	1988	28,413	11-19	1.7% M 2.1% F
Coggans (1991), evaluation of drug education in Scotland	Not known	Scotland	1988	1,200	13-16	12%
Balding (1988)	School	Variable	1987	15,071	11-16	1.5% M 1.6% F
Audience Selection, for News of the World	Telephone	England	1985		16-34	2%

reported a 2-percent rate among 16- to 34-year-olds. These data (table 6) are highly variable and were collected in many different ways for many purposes; therefore, results range from less than 1 percent to 12 percent. The data from Balding (1989, 1993) probably are reliable although not representative of the country as a whole.

LOCAL VSA STATISTICS

Some recent surveys of local populations are summarized in table 7. They mostly show "ever used" VSA rates of 3-10 percent with the number of males and females roughly equal; current use is low, probably about 1 percent. Stuart (1986) surveyed 1,729 children in 13 schools in the Macclesfield Health Authority area and reported 1 percent experimentation by age 11, 4 percent by age 12, 8 percent by age 13, 12 percent by age 14, 9 percent by age 15, and 5 percent by age 16, which resembles the age profile of the mortality data. Pritchard and Cox (1990) repeated a questionnaire survey in schools in an area of Boumemouth and Southampton with a high proportion of socioeconomic deprivation and found 8-percent use in 1989 (3 percent VSA alone, 5 percent with other drugs), 5 percent in 1986, and 4 percent in 1985. Sixty-four percent of users in 1989 were male. Ellis and colleagues (1988) in Pontefract in 1988 found 4.5 percent drug and solvent users (1.5 percent solvent only) in a survey of 1,882 14- to 15-year-old school children. However, 24 percent of the children were absent due to industrial relations disputes waged by teachers. Three studies (Foley and Todhunter 1992; Shetland Health Board 1992; Stalybridge Drugs Education Project 1989) reported experimentation with alkyl nitrites of 15-16 percent, 9 percent, and 5 percent, respectively. These levels, if accurate, are reasons for concern. These disparate "snapshots" taken in one area at one time are very difficult to interpret, particularly when the problem is known to be sporadic in nature (O'Bryan 1989).

SELECTED POPULATIONS

Parker and colleagues (1988) carried out a multiagency survey in Bristol from 1984 to 1985 in which they found 759 problem drug users aged 10-44; 17 percent had problems associated with VSA. Jacobs and Ghodse (1988) found 43 percent of 47 consecutive admissions to a West London Secure Unit used "solvents." Sixty percent of the abusers inhaled

TABLE 7. *Local surveys giving information on prevalence of VSA in the United Kingdom.*

Survey	Type	Place	Year	N	Age range (yrs)	% VSA & sex
Questor (1992), for Yorkshire Health Authority	Ever used	West Yorkshire	1992	1481	8-18	M = F 11% at 16 10% at 14-15 58% at 17-18
Thomas (1991), for Drug Concern	Questionnaire	Croydon	1991	280	Not known	20% ever used 2.5% current users
Shetland Health Board (1992)	Questionnaire	Shetland	1992(?)	968	11-17	5% sniffed glue 9% amyl nitrite
Oldham Metropolitan Borough (1990)	Exeter questionnaire	Oldham	1990	884	13-15	3%M 6%F
Pritchard & Cox (1990)	School questionnaire repeat of 1985 & 1986	Boumemouth & Southampton inner city	1985 & 1989	934	14-16	8% 1989 64% M 36% F 5% 1986 4% 1985
Mid Glamorgan Crime Prevention Unit (1992)	Questionnaire	Mid Glamorgan	1991	13,437	13-18	12%M=F 3% past week

TABLE 7. *Local surveys giving information on prevalence of VSA in the United Kingdom (continued).*

Survey	Type	Place	Year	N	Age range (yrs)	% VSA & sex
Stalybridge Drugs Education Project (1989)	School questionnaire	Thameside	1988	304	15-16	20% 5% amyl nitrite
Farley and Simons (1990)	School	Norwich	1989	780	13-18	11% 15-16 M 15% 15-l6 F 1 % current use
Foley & Todhunter (1992)	Further education	Wirral	1992	79 snow-balling		15-16% amyl nitrite
Swadi (1988)	School	London	1987(?)	3,073	11-16	11.0% M = F or F>M
Stuart (1986)	School	Macclesfield	1985	1,729	11-18	6.0%
Cooke et al. (1985)	School	South Wales	1985	4,414	11-18	6.8% 0.7% current
Chadwick et al. (1989)	School	South London	1983	7,485	13-16	4.1%

TABLE 7. *Local surveys giving information on prevalence of VSA in the United Kingdom (continued).*

Survey	Type	Place	Year	N	Age range (yrs)	% VSA & sex
Faber (1985)		East Sussex	1983	7,343	11-18	8.1%
Diamond et al. (1988)	School	Boumemouth	1986	602	14-16	8.8%
Ellis and colleagues (1988)	School	Pontefract	1986 & 1987	1,882	14-15	1.5% 24% absentees
Brown & Lawton (1988)	School	Portsmouth & Havant	1986 & 1987	1,063	11-19	over 4% > 7% age 11

3 or more days per week, 50 percent for more than 5 hours per day. Butane cigarette lighter fluid was the preferred product of 80 percent of the users. Evans (1986) found that, of the 212 young people in youth centers in the London Borough of Tower Hamlets, 24 percent of males and 21 percent of females had tried glue or solvents. Allison and Jerrom (1984) found 80 percent of 65 delinquents in a Scottish institutional school had used solvents, and Lockhart and Lennox (1983) similarly found that 66 percent of users in a Secure Unit in Northern Ireland had used them. In a survey of 2,417 social science students, "The Thatcher Generation" for New Society, Williams (1986) found 4 percent of females and 10 percent of males had used "solvents," although the sample contained twice as many girls as boys, which reflects the composition of the social science student population. Of the 82 percent who were Caucasian, 6 percent sniffed; of the 5 percent who were Asian, 5 percent sniffed; and of the 5 percent who were West Indian, 2 percent sniffed. This mix of surveys shows that the majority of individuals in small closed (i.e., deviant) populations can at least be experimental volatile substance abusers.

SURVEY METHODOLOGIES

The United Kingdom VSA-related mortality data and worldwide experience suggest that the population most at risk are schoolage children about 15 years old. Consequently, most attempts to gather information have been made using school-based questionnaire surveys. The problem lies in validating the instruments used and in ensuring that those most at risk actually are in school when the questionnaire is administered (Chadwick et al. 1989; Swadi 1990). Chadwick and colleagues (1991) administered a self-completed questionnaire to children aged 13-16 in 16 secondary schools in South London in order to obtain a sample for subsequent neurological assessment. The questionnaire used was validated by standardized individual face-to-face assessments by a psychologist who was unaware of the child's response to the questionnaire. Breath also was tested for abuse of volatile compounds (Ramsey 1984), primarily to ensure that the subsequent neurological assessment was not performed while the subject was intoxicated. In order to get permission to do the survey, Chadwick and colleagues (1991) found it necessary to allow parents to withdraw consent. Of the 7,485 children who were on the class registers, 825 (11 percent overall, but 35 percent in one school) were excluded at the request of parents, and 1,180 (15.8 percent) were officially recorded as absent. The questionnaire was

presented as a confidential "Schools Health Survey" and contained 31 questions of which the one relevant to this topic was:

Have you ever sniffed glue, solvents or anything else on purpose?	Yes/No
If "Yes": Write down the names of everything you ever sniffed or inhaled	.....
Have you ever sniffed enough to feel "high" or intoxicated?	Yes /No/Don't know

At interview they found only 106 of the 133 positive respondents confirmed the questionnaire response, whereas all the matched control group confirmed their negative response. Of the 106, 19.4 percent had sniffed more than 30 times, and 33.9 percent had sniffed once or twice. The toxicological testing not only detected volatile compounds in six of the positive respondents but also in one of the negative controls (toluene). Experiences such as these illustrate how much attention to detail is required to collect meaningful data in this area. Swadi (1990) discussed the validity of data collected from adolescents using self-reported questionnaires. Clearly worded questionnaires, comprehensible to youngsters aged 11 or younger with poor reading age and comprehension are not easy to produce, particularly if they are to be used by people of different cultures or circumstances. For example, the following questions produce consistently different results (Edwards, personal communication, July 21, 1993):

On how many occasions (if any) have you sniffed glue, or breathed the contents of aerosol spray cans, or inhaled any other gases or sprays to get high?						
a. in your lifetime 0	1-2	3-5	6-9	10-19	20-39	40+

From the High School Senior Survey, Monitoring the Future study, Johnston and colleagues (1992), the above *gives 17 percent repeatedly.*

Have you ever "sniffed" ("or huffed") glue, gas, sprays, or anything like that to get high? (Do NOT include cocaine.)
Yes/No

The American Drug and Alcohol Survey™ (Oetting and colleagues 1990), shown above, *gives 12 percent repeatedly.*

SUMMARY OF UNITED KINGDOM VSA-RELATED PREVALENCE DATA

Tables 6, 7, and 8 summarize the information from the United Kingdom mostly from survey questionnaires. A substantial minority (up to 10 percent) of children in school experiment with the abuse of volatile compounds at some time, although fewer than 1 percent continue to use them regularly. Among the selected population studies, reported use is much higher, which often is why the populations were selected in the first place! Trends in use and any change in pattern of use over time is poorly documented. Little information is available about which products are abused and the methods of abuse. Anecdotal reports of roughly equal VSA between the sexes is supported by the majority of surveys. The suspected trend toward younger children experimenting is not adequately investigated since most studies take place only in secondary schools (with children ages 11 and older), although the "ever used" type of question should reveal this if the age of first use also is asked.

Risk factors such as sniffing alone or in company are not well addressed, although Sourindhrin and Baird (1984) reported that 92.5 percent of 134 users studied in Glasgow used volatile substances as a group activity. Evans and Raistrick (1987) compared toluene and butane users and found that 74 percent of the glue users sniffed as a group, while 83 percent of butane users sniffed alone. They attributed this to the longer duration of intoxication caused by toluene. However, Jacobs and Ghodse (1988) reported that 75 percent of 20 delinquents, most of whom abused butane cigarette lighter fuel, did so as a group.

TABLE 8. *Surveys of selected populations in the United Kingdom for VSA.*

Survey	Type	Place	Year	N	Age range (yrs)	% VSA & sex
Parker & colleagues (1988)	Problem drug users	Bristol drug agencies	1984-1985	759	Under 20	M:F 5:1 17%
Jacobs & Ghodse (1988)	Admissions	West London Secure Unit		47		43%
Evans (1986)	Youth clubs	London Tower Hamlets	1985	212	9-28	24% M 21% F
Williams (1986)	Social science students	England & Wales	1985-1986	2,417	< 14 19+	
Allison & Jerrom (1984)	Delinquents	Scotland Institutional Schools		65		80%
Lockhart & Lennox (1983)	Delinquents	Northern Ireland Secure Unit		20	mean 15.9	66%

With the United Kingdom population of about 5.0 million youngsters aged between 12 and 19, there may be as many as 590,000 who could have experimented with volatile substances, and up to 59,000 could be regular users (Gossop 1993).

VSA IN UNITED KINGDOM INDUSTRY

The Health and Safety Executive data on workplace exposure show that industry generally controls solvent exposure of workers quite well. High personal exposures are not widespread and tend to occur in a fairly small number of cases involving "end user" processes (e.g., mixing or spraying) and usually involve mixtures of solvents rather than single substances. The degree to which VSA is a contributory factor in exposure is uncertain, but there probably is greater opportunity for abuse to occur in these same end user processes. It is acknowledged that there is evidence for the occurrence of VSA in industry, but the extent of the practice is not known. The Control of Substances Hazardous to Health Regulations 1988 put great emphasis on the assessment of risks from the industrial use of chemicals. This includes assessment of the potential for abuse, together with appropriate training and supervision in the proper use of chemicals (Parker 1989). In the United States, Suruda and McGlothlin (1990) reported 11 workplace deaths from nitrous oxide abuse, six of which were restaurants using nitrous oxide to whip cream; the remainder were hospital or dental workers.

LEGISLATION

Legislation to limit the sale of diethyl ether was introduced in Ireland at the turn of the century by a Government under pressure from the temperance societies and faced with the loss of tax revenues from alcohol (Nagle 1968). In England and Wales various acts, statutes, and bylaws have been used—some dating from the mid-19th century to address problems caused by intoxicated youngsters (Gossop 1993). These include:

- Ecclesiastical Courts Jurisdiction Act 1860
- Offences Against the Person Act 1861
- Town and Gardens Protection Act 1863

- Children's Act 1989: Section 17 requires local authorities to safeguard and promote the welfare of children, which in effect gives children the right of access to specialized services if VSA is endangering their health or development. Section 46 enables a constable to remove to safe accommodation a child whom he has reasonable cause to believe would suffer significant harm if the child were not removed.

- Public Order Act 1986: Section 5 deals with disorderly or abusive behavior in public.

- Criminal Justice Act 1991: There are provisions under Paragraph 6 of Schedule la for a judge or magistrate to recommend by court order that a person receive treatment as part of a community sentence for offenses committed under the influence of drugs or solvents.

- Road Traffic Act 1988: Under this act, it is an offense to be intoxicated while in charge of a motor vehicle.

- Bylaws: Under a British Rail bylaw, it is an offense to be intoxicated on railway property.

- Transport and Works Act 1992: This act covers intoxication of staff employed on the railway.

Scotland, with its own legal system, has the Solvent Abuse (Scotland) Act of 1983 which amends the Social Work (Scotland) Act of 1968 and enables children to be referred to a Children's Panel.

In 1983, the United Kingdom Government undertook a consultation exercise to address VSA together with the police, the courts, drug treatment agencies, Members of Parliament, local councillors, parents, schools, social security departments, the health service, and retailers. The majority of those who responded felt that criminalizing VSA would be counterproductive, likely to deter users from seeking help and to burden many young people with a criminal record. The Government, faced with unscrupulous traders selling glue-sniffing kits, supported a Private

Members Bill that became the Intoxicating Substances (Supply) Act of 1985. Under this act:

> It is an offense for a person to supply or offer to supply a substance other than a controlled drug:
>
> a. To a person under the age of 18 whom he knows or has reasonable cause to believe to be under that age; or,
>
> b. To a person:
>
> (i) who is acting on behalf of a person under that age: and
>
> (ii) whom he knows, or has reasonable cause to believe to be so acting if he knows or has reasonable cause to believe that the substance is or its fumes are likely to be inhaled by the person under the age of 18 for the purpose of intoxication.

Conviction carries a penalty of up to 6 months imprisonment or a fine not exceeding level 5 on the standard scale, presently £5,000, or both. Under Scottish common law, the courts have imposed fines of £12,000 and prison sentences of 2 years for knowingly supplying substances to young people for VSA.

CIVIL LAW

Despite the large mortality rate, there are neither instances where legal redress has been sought against a manufacturer of an abused product in the United Kingdom nor any out-of-court settlements. However, it is probable that industry tries to minimize publicity in this area.

PREVENTION AND TREATMENT

The initial response in the early 1980s to this problem in the United Kingdom was low key because of the fear that inappropriate publicity would arouse curiosity and be counterproductive. Many thought the

problem would go away like other teenage fads. In 1988, at the suggestion of BAMA, a repeat of the 1983 meeting was held at Guy's Hospital to assess the efficacy of the approaches recommended at the previous meeting (Flanagan et al. 1989). The second meeting concluded that further restrictions on the sale of abused products was unlikely to be practical and that a broad-based educational strategy in schools offered the best hope to limit the problem. Johns (1991) in an editorial commented that the 1,000 recorded deaths should be sufficient to get VSA back on the national drug abuse agenda.

Faced with evidence of increasing mortality, the Government became more proactive; 1992 was a general election year, and Britain held the presidency of the European Community between July and December. During this period, the United Kingdom hosted the first European Drug Prevention Week (EDPW). In February, the United Kingdom Department of Health commissioned a national television advertising campaign to publicize the availability of a leaflet titled "Solvents: A Parent's Guide," which gave information on the nature of VSA, what to look for, and where to seek help and advice. About 700,000 of these leaflets were distributed during the campaign and a further 2,900,000 during EDPW. FREEPOST and a toll-free telephone service handled requests, and they also were made available from doctors' surgeries, libraries, and community pharmacies. The total cost of the project was £2.4M, and an evaluation of the campaign was undertaken by Research International (1992). In October 1992, the United Kingdom Department of Health ran a pilot campaign designed to compare the effectiveness of different direct distribution methods for a shorter leaflet, "Solvent Abuse—Every Parents Guide." Magazine inserts and household delivery with and without the support of television advertising were evaluated, and the results were published (Research International 1992).

In 1993, the United Kingdom Home Office Advisory Council on the Misuse of Drugs published the report of its Prevention Working Party, "Drug Education in Schools: The Need for a New Impetus" (Advisory Council on the Misuse of Drugs 1993). The report called for:

- High-quality classroom drug education on a national scale;

- Partnerships between pupils, teachers, parents, governors, and the community to tackle drug misuse;

- Regular national surveys on the prevalence and trends in teenage drug misuse;

- National targets similar to those in the Government White Paper, *The Health of the Nation* (Department of Health 1992);

- Drug education to be linked with other aspects of health education and personal development;

- Training for teachers in drug education programs and in management of drug-related incidents;

- National standards and guidelines on good practice in school-based education to be established and reviewed regularly; and

- Review by every school of its response to drug misuse, development of a policy on drug misuse, and assurance that a drug education program is implemented and monitored.

The recommended approach is to consider VSA along with other drug issues as a part of health education. A number of aspects of health education now are included in the Programmes of Study for the National Curriculum Science, National Curriculum Council (1990) that schools statutorily are required to teach. For example:

- Children ages 5-7 "should be introduced to ideas about how they keep healthy through exercise, personal hygiene, diet, rest and personal safety; and to the role of drugs as medicines."

- Children ages 7-11 "should study how . . . lifestyle can affect health, and learn about factors that can contribute to good health including the defence systems of the body, diet, personal hygiene, safe handling of food, dental care and exercise. They should be introduced to the fact that while all medicines are drugs, not all drugs are medicines. They should begin to be aware of the harmful effect on health resulting from an abuse of tobacco and other drugs."

- Children ages 11-14 "should extend their study of the ways in which the healthy functioning of the human body may be affected by diet, lifestyle, bacteria and viruses [including Human Immunodeficiency Virus (HIV)], the abuse of solvents, tobacco, alcohol and other drugs."

- Children ages 14-16 "should have opportunities to consider the effects of solvents, alcohol, tobacco and other drugs on the way the human body functions."

On a different level, organizations such as The Advisory Council on Alcohol and Drug Education produce training material for use in both primary and secondary schools. The package, "Skills for the Primary School Child" (The Advisory Council on Alcohol and Drug Education 1991), for example, deals with avoiding drug and other substance misuse, as well as more general health education topics such as personal development, bullying, self-esteem, and self-confidence.

In 1984, the BAMA founded Re-Solv (Liss 1989), which now is an independent national charity with over 290 members from trade organizations, manufacturers, local and health authorities, voluntary organizations, general medical practices, and individuals. It produces public information packs in English and in various Asian languages and Welsh; videos; information packs for professionals; leaflets; and training material for retailer education. Retail staff are made aware that some of the products they sell can be misused and are advised on how to say no to suspicious prospective purchasers. Counter staff are advised to look out for suspicious purchasing patterns, intoxicated customers, and simultaneous purchases of glue and plastic bags. Re-Solv also produces materials advising retailers of their obligations under the law. However, Esmail and colleagues (1992) examined the effects of these and other attempts at prevention and suggested that the result may have been to make access to solvent-based glues considerably more difficult, with little effect on the availability of the other products.

INDUSTRY RESPONSE

Industry is able to modify abusable products but only does so when it finds it expedient. For example, one European producer of correction fluid developed a solvent-free product when local bans on solvent-containing products threatened its share in the lucrative school market. A water-based product was initially marketed but it dried very slowly. Eventually, a satisfactory replacement with low abuse potential was produced. In contrast, the response of the cigarette lighter refill manufacturers, when a ban of their product was mooted, was to claim that it was pointless for them to do anything (Esmail et al. 1992). They claimed that, even if they were successful in deterring youngsters from

using their product, the children merely would find another source of volatile compound. The producers of butane were more responsive, and they are prepared to research aversive additives. On a wider front, the United Kingdom chemical industry has a program called Product Stewardship and a Responsible Care program, which, although primarily conceived to address environmental issues, may be a means to bring deliberate product misuse to the attention of the chemical producers.

Labeling

Labeling of abusable products has been considered in the United Kingdom, but any proposal to do so now requires an agreement at the European Community level and would in any case be controversial. One interesting suggestion is to label wholesale packs to remind retailers of the abuse potential of certain products without drawing them to the attention of potential users.

COMMUNITY RESOURCES

There are very few agencies dealing directly with volatile substance abusers at the street level, and most are set up in response to the death of a local child. The organizers tend to lack professional training and resources, and their organizations often dissolve with time. Community Drug Teams (CDTs) are underresourced and often feel it is not appropriate to mix children with VSA problems with their older clients, most of whom are opiate users.

There is a considerable social stigma attached to VSA. Even heroin users view such users with contempt. One local response to fill this gap between ad hoc community groups and the CDTs is the Solvent Abuse Resource Group (SARG), which was founded in Blackbum in 1989 to provide services to users and professionals. It provides services to users and parents of users who drop in or telephone; SARG accepts referrals from other agencies. It also offers support and training to professional and lay groups. It operates on a very limited budget and is run by a retired child care social worker and a handful of dedicated councillors. Although SARG has received grants from the Department of Health and Blackbum Borough Council, funding usually is its main problem, as it is for many groups of its kind. Ives (1991) edited the proceedings of a conference held by the National Children's Bureau in 1990 that include

contributions from many small groups working with volatile substance abusers.

CLINICAL DIAGNOSIS

At the clinical level, Meredith and colleagues (1989) have discussed the diagnosis of VSA and stress the importance of a laboratory examination of blood for volatile compounds in cases of drunken behavior, unexplained listlessness, anorexia, and moodiness in children. Reliable analytical methods are available to detect all the compounds discussed in this chapter in blood, except unchanged alkyl nitrites and gasoline (Streete et al. 1992). It also is important from a toxicological standpoint to ensure that, when reporting data on VSA, the chemical composition of all products mentioned here is investigated. This usually means that a chemical analysis is required (Ramsey and Flanagan 1982; Rosenberg and Sharp 1992).

CONCLUSIONS

About 5 percent of all deaths in teenagers in England and Wales are now caused by VSA. Faced with significant acute mortality, probably greater than that resulting directly from heroin and cocaine in this age group, and evidence that death often occurs when there is little or no previous history of VSA, the view cannot be taken that an experimental sniff of butane can be regarded as part of growing up. On the other hand, the sporadic nature of the problem makes coordinating a local response particularly difficult. In the absence of reliable data about the prevalence and detailed nature of the problem, the relative hazard from abuse of different products is difficult to assess. However, when 28 percent of all VSA deaths are caused by one product, cigarette lighter refills, the view that product-oriented policies are impractical and unenforceable must be reconsidered.

Control of supply rarely has been successful in any area of drug abuse prevention and is highly unlikely to be successful in the case of VSA since abusable products surround us in our domestic and working lives. However, there are many good reasons to limit the amount of volatile organic compounds that are released into the environment, and there are simple modifications that could render some products less attractive and inconvenient to misuse. The long-term objective must be to persuade

youngsters that there are better things to do than seek the most convenient chemical high. Meanwhile, the tragic waste of two young lives every week in the United Kingdom cannot be ignored.

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Treatment Strategies for Volatile Solvent Abusers in the United States

Pamela Jumper-Thurman, Barbara Plested, and Fred Beauvais

Treatment for substance abuse dependence has presented a major challenge in the United States because of the complex nature of drug abuse behavior. As treatment has reached greater levels of sophistication, it is clear that there are distinct differences in the treatment methods that are needed to treat users of the various chemicals effectively. For instance, people with cocaine addiction appear to have lower relapse potential if they complete a program with specific implications for cocaine treatment (Rodriguez 1989). Heroin addiction represents yet another treatment modality with unique considerations, particularly concerning the use of methadone maintenance (Dole and Nyswander 1965).

The treatment and prevention of solvent abuse and dependence has presented a particularly difficult challenge for service providers, especially given the general lack of direction for effective treatment strategies. In addition to the physiological, neurological, and emotional challenges abusers face, volatile solvent-abusing youth frequently bring with them a multitude of other problems—academic, legal, social, and family issues. Certainly, volatile solvent abusers are among the most difficult and refractory people to treat (Jumper-Thurman and Beauvais 1992; Oetting and Webb 1992). In addition to the difficulty in working with this population, little practical information has been available to meet the specific needs of solvent abusers. The information presented in this chapter is based on interviews and focus groups and also reflects the treatment and research experience of the authors.

The interviews and focus groups included 37 treatment professionals providing treatment for solvent abusers, 14 adult outpatients, and 265 youths who represent inpatient, outpatient, and experimental solvent abusers. Inhalant treatment facilities and schools reporting problems with inhalant use arranged focus groups and interviews that would provide information regarding solvent abuse and factors related to treatment and prevention. Parental and client consent was obtained to facilitate 10

focus groups with solvent abusers. In addition, numerous interviews and focus groups with treatment professionals were conducted. The focus groups for professionals centered on (1) characteristics unique to volatile solvent abusers, (2) methods used that were effective, (3) methods that proved ineffective, (4) obstacles to treatment, (5) what resources are used most often, and (6) what needs still are unmet. Focus groups for clients were more general in nature, allowing open discussion regarding first use, transition to chronic use, patterns of use, the prevention efforts they had encountered, and treatment methods that worked most effectively for them. Combining the existing research base with the experiential knowledge of treatment providers and patients has led to at least a beginning body of knowledge regarding treatment approaches to solvent abuse treatment. The comments put forth here pertain mostly to the characteristics and treatment needs of young solvent abusers, but it must be recognized that there are a substantial number of adults who also are in need of treatment. Unfortunately, very little is known about this group of adult users since they often are a "hidden population" in that few, if any, treatment centers have consistent process and outcome data from a solvent-specific treatment program for these adult users. They can be difficult to access because they may become transient or homeless due to their using behaviors and frequently are ostracized by other drug users.

BACKGROUND

Solvent use has been problematic for quite some time. With the changes in industrial and household chemistry in recent years, however, many new solvents have been developed in response to the demands of quickly advancing technology. The majority of these substances have the potential to cause a variety of toxic effects (Nicholi 1983; Rosenberg and Sharp 1992). Most of the chemicals are widely available and quite accessible to people of any age. While many States do recognize the danger presented by these chemicals and have either made or are in the process of making abuse of these chemicals and the sale of them to minors an illegal activity, it essentially is impossible to eliminate access to volatile solvents.

Solvent abuse can occur at any age, but most generally occurs in late childhood or early adolescence. Availability and accessibility often are cited as two major reasons underlying the choice of solvents (Beauvais 1986). Certainly these two factors create an unlimited environment for initial and continued use. However, many youth, in treatment indicate

that they chose solvents not only because of their accessibility, but because they believed the solvent led to a quicker high and that the solvent high was easier to control. For example, when they start to "come down," they say that they know exactly when to huff again to maintain the high. Solvents, therefore, are not only accessible but they can be preferred or favored drugs.

CHARACTERISTICS OF SOLVENT ABUSERS

Solvent abusers often present with a wide variety of social, educational, and economic problems (Oetting and Webb 1992). Treatment providers also report that these youths often have poor interpersonal relationships, family difficulties, and school problems. Some providers have reported that they find solvent-abusing youths less aggressive in treatment, while others have noted a high degree of aggressive behavior. It is not clear if the particular chemical used leads to this different reaction or if developmental, cultural, or regional factors contribute. Many of the youths have experienced poverty and family difficulties and report impulsive or risk-taking behavior or both, as well as frequent disclosures of physical and sexual abuse.

Physical harm resulting from solvent abuse has been documented clearly in the literature (Hormes et al. 1986; Nicholi 1983; Rosenberg and Sharp 1992). It is important to note, however, that most toxic effects of solvent abuse do not occur during initial use. Continued use, however, can result in serious complications, and these complications constitute one of the primary considerations in the treatment of solvent abuse and dependence. Of particular concern is the widespread neuropsychological damage that may be present.

It also has been well established in the treatment community that children and adolescents who are admitted to therapy for solvent abuse or dependence usually do not present willingly (Jumper-Thurman and Plested, submitted). It is common for a parent, court worker, social service worker, teacher, or other concerned relative to refer or admit the youth for treatment.

In summary, when presented with a solvent-abusing patient, one is attempting to work with an unwilling individual who may have cognitive deficits, as well as a multitude of additional social and psychological problems. Further, there has been little in either the treatment or research

field to give the treatment provider much direction. Given these challenges, assessment and treatment must be creative, flexible, and comprehensive. In addition, since researchers are at a very early stage in their knowledge of effective treatment, it is critical that efforts and outcomes be documented thoroughly so that others may be informed as to what works and what does not.

STRATEGIES IN TREATMENT

The strategies for treatment were developed based on information provided from the focus groups, interviews, and personal treatment and research experience of the authors. It is important to note that effective treatment strategies just now are being developed. Basic research issues regarding effective treatment—assessment, intervention, and inpatient versus outpatient treatment—are discussed by Jumper-Thurman and Beauvais (1992). Certainly, further collaboration between research and service provision must occur for progress in the area of volatile solvent treatment. Information from both patients and providers indicate that, when admitted for treatment, solvent-abusing children are distant and hard to reach. However, they are anxious to bond quickly to their peer group. Some treatment facilities have utilized this as an opportunity for treatment and have developed a "peer patient advocate" system (Jumper-Thurman and Plested, submitted). Using a peer who is further along in the treatment process provides the incoming youths with someone to "teach them the ropes" and give them support. This relationship is monitored closely by treatment staff and seems to be very effective given the remarks made by youths in those centers: "It's really scary to be away from home, I felt like I had a big brother to watch out for me"; "When you're in a new place and you don't know the rules, it helps to have someone watching out for you"; and "I didn't want to talk to an adult, so I had someone my age to listen to me."

Other factors also are essential for the treatment of volatile solvent abusers. Because of the serious physical risks, assessment must ascertain physical condition, cognitive functioning, extent of neurological impairment, psychosocial supports, individual strengths, personal functioning, and legal standing (Jumper-Thurman and Plested, submitted). With the additional problems facing these children, consideration for continuing care or after care also must begin the first day of treatment and continue as treatment progresses.

Medical management and detoxification are two issues of particular importance in the early phases of solvent abuse treatment (Jumper-Thurman and Beauvais 1992). Depending on the length and intensity of solvent use, there may be dysfunction in a number of body systems including the kidneys, liver, and blood (Rosenberg and Sharp 1992). Acute medical intervention may be needed for these problems, but there also may be subclinical patterns that will be resolved over time with cessation of solvent use. The acute neurological effects also may take a considerable amount of time to resolve. Unless a sufficient amount of time is allowed for detoxification, the individual will not be capable of engaging in the therapeutic aspects of treatment. This problem is only exacerbated by the emotional turmoil that is demonstrated early in treatment. Treatment providers indicate that newly admitted youths are apprehensive and angry about being in a treatment environment, anxious about leaving family and friends behind, and most importantly are unable to function at the cognitive level needed for attendance in school and in group and individual sessions.

For solvent abusers, there is a need for an extended period of "treatment readiness" that lasts for a minimum of 4 weeks but may last much longer (E. Fredlund, personal communication, September 30, 1993); this time allows the body to detoxify from the chemical effects of inhalant abuse. During this time the emphasis should be on basic supportive care, including nutrition, exercise, sleep, and a calm environment. Some providers have suggested that patients not initially attend school, then attend a quarter or half of the time and work up to full school hours. They are allowed to observe group sessions but not required to participate. Time spent in individual therapy is of shorter duration, and more recreation time is provided. They also spend time with their peer advocate and participate in assessment and testing. Providers indicate that this is a very important time for youths to become better acquainted with staff and that it provides facilitation and preparation for more intensive treatment.

Many treatment centers still are reluctant to accept solvent-abusing youth. Many providers still believe that these youths are brain damaged and that there is no hope. Yet, these youths do have strengths, and there is hope; there is some emerging evidence that the neurological damage incurred through solvent use is not permanent and a great deal of function can be restored (N. Rosenberg, personal communication, August 2, 1993). However, newly admitted solvent-abusing youths usually are not able to function as well as other classes of substance abusers, such as alcohol-

abusing youth, because of the extent of chemical effects. Solvent-abusing patients must have their treatment readiness time for detoxification. It also is imperative that the treatment providers keep their expectations for solvent-abusing youths realistic during this time. Otherwise, the result is frustration and burnout for the provider. These youths initially may be slower to respond to treatment but, given the current therapeutic opportunities and considerations, they do respond, and early reports indicate treatment success.

Families of solvent abusers often are highly dysfunctional, which increases the need for a thorough assessment of family stability, structure, and dynamics (Oetting and Webb 1992). Treatment planning must include the family, significant caretakers, or both. Interventions with the family might be focused on providing "reparenting," social bonding skills, discipline, and communication issues. Anecdotal reports from providers indicate that they hold regular "family weekends," times when the family receives intense therapeutic intervention along with the patient who is in treatment. One also must consider that, when the youth leaves treatment, he or she often returns to a family of substance users and may feel alienated if he or she abstains from drug use (Jumper-Thurman and Beauvais 1992). This type of conflict can precipitate a quick relapse. It also must be considered that, if the family situation is too unstable to support the youth, the most effective treatment goal may be to work toward foster care or transitional placement for the discharged youth.

Peers have a powerful influence on adolescent drug use (Oetting and Beauvais 1986). Usually the peer clusters of solvent abusers are highly deviant, making them even more impervious to positive social influences (Oetting and Webb 1992). Assessment must consider both the structure and norms of the abuser's peer cluster so that treatment goals can be established to weaken or break those social bonds and replace the cluster with a more constructive group of peers. Use of the peer patient advocate appears to hold potential as a successful treatment intervention and turns a potential liability into a therapeutic asset. It is clear that the peer structure is powerful for these youths and that essential needs are met by affiliation with the peer group. Therefore, creative interventions, though sometimes difficult to conceptualize, are necessary components of effective treatment.

The period in which youths return to the community following treatment can be a critical time. They require intensive assistance in establishing a healthy environment. Both home and school settings may present

challenges to a healthy readjustment. It will be difficult to remain separate from many of the people with whom they previously associated. Their absence from the school and community for treatment may cause some difficulty. Therefore, it is important to include community resources and educational staff (i.e., teachers and counselors) early in treatment. This liaison should be strengthened throughout the therapeutic process and used intensively in discharge planning. It is essential that the youths and families have an awareness of the community resources available to them; they also should feel comfortable using these services.

Knowledge about treatment outcome is extremely limited with this population since only a few facilities specific to solvent treatment have been established. Certainly there is a clear need for objective and tight evaluation of treatment effects, as well as additional research on treatment outcome.

Finally, when working with children and adolescents, it is essential to recognize that the effectiveness of the treatment providers is paramount to success (Jumper-Thurman and Plested, submitted). Care of and therapy for solvent-abusing youth are challenging jobs. Such tasks require clinical judgement, common sense, a good sense of humor, patience, intelligence, and most of all a basic understanding of how to work with solvent-abusing adolescents.

The general nature of treatment is the caring for and healing of others. Given that definition, there often is the tendency to overlook one's own needs or to "put them on the back burner." When working with solvent-abusing youth, the demands are many. Providers tell us that self-care becomes paramount. Providers not only have a right to self-care; ethically, there is an obligation to self-care.

In summary, what constitutes effective treatment for solvent abusers? Recognizing the many obstacles facing youths who have abused solvents, a comprehensive treatment plan should include: (1) adequate time for detoxification or treatment readiness and physical recovery; (2) use of a peer patient advocate system; (3) thorough assessment of physical, cognitive, and neurological functioning; (4) recognition and building of existing strengths and skills; (5) development of new strengths; (6) treatment-provider training specific to solvent-abusing patients; (7) addressing of personal and family issues; and (8) cultivation of the resources necessary to initiate a healthy transition back into the home community (Jumper-Thurman and Plested, submitted). Often treatment,

by its nature, is focused on problems and obstacles. Yet, when confronted with a solvent-abusing adolescent with multiple problems, it is essential to find and build on the existing strengths. These strengths may be family support, caring for friends, artistic skills, or writing or musical ability. It sometimes is helpful to reframe negative behavior into a strength so that there are blocks on which to build other strengths. It is clear that those willing to provide treatment of solvent abusers must be prepared to work with individuals who have a greater breadth and depth of personal and social problems. Providers must acknowledge that volatile solvent-abusing patients are not hopeless, although it is important to keep treatment expectations realistic. Inpatient treatment must include an extended period of detoxification or treatment readiness before initiating specific therapeutic interventions. In fact, effective treatment can be expected to be long term, possibly even up to 2 years. Certainly this sounds like an expensive endeavor; however, the cost of volatile solvent abuse treatment must be weighed against further costs for this population and the public, including incarceration, medical expenses, and welfare support (Jumper-Thurman and Beauvais 1992).

CONCLUSION

What is presented here is only a beginning. There are a multitude of questions that need to be answered, and extensive and specific treatment protocols need to be developed. Other research directions include:

1. Ethnographic studies of users to identify patterns of use and the factors related to the transition to chronic and solitary use;

2. Identification and scientific study of certain therapeutic approaches that might be effective and appropriate for volatile solvent abusers;

3. A cost-benefit analysis of volatile solvent treatment; and

4. Additional research on types of interventions that can be used to treat solvent abusers effectively in an outpatient setting.

It is imperative to support additional research and further collaboration with service providers for development of successful treatment strategies for this unique population.

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Gathering Epidemiologic Information on Inhalant Abuse: Some Methodological Issues

Blanche Frank

Given what is known about inhalant use, an urgency exists to know more. For a variety of reasons, however, the current base of epidemiologic information barely scratches the surface. In an effort to understand the methodological research issues involved, this chapter reviews ways in which drug abuse research is conducted, drawing mainly on examples in New York City, specifically, and New York State, generally, and the particular limitations associated with research concerning inhalant use.

THE EXISTING BASE OF INFORMATION

From information already gathered, it is clear that young children and adolescents are especially susceptible to the use of inhalants, including gasoline, paint thinner, a variety of solvents, nitrous oxide, and butyl nitrites. Numerous school surveys attest to this fact, as do ethnographic-type observations of youth on the streets of cities and villages throughout the world (Frank et al. 1988; Mata and Andrew 1988; Medina-Mora and Ortiz 1988).

Indications also exist that trends in inhalant use among youth are either increasing or remaining stable. For instance, while the use of alcohol, cigarettes, marijuana, and cocaine have declined among secondary school students in New York State, especially over the past decade or so, the use of inhalants generally has remained unchanged. The National High School Senior Survey, which also now includes 8th graders and 10th graders, shows almost one in five students having ever used inhalants among each of these grade levels over the past several years. In 1992, 17 percent of students in each of these grades had used inhalants at least once in their lifetimes (Johnston 1993).

Studies also suggest that the use of inhalants among the very young (with the mode at 12 years to 13 years of age) may be a predictor of more

serious drug use to come and a variety of other problem behaviors in the future (Beauvais 1992; Kandel 1975).

REASONS FOR LIMITED RESEARCH

Despite the existence of this compelling knowledge, the current state of epidemiologic research into inhalant abuse leaves much to be desired. A variety of reasons may exist for the deficit. The major reasons probably concern the fact that inhalant abuse is a relatively hidden phenomenon engaged in by those who perhaps are the least vocal and the most disenfranchised, with consequences of use that are not always interpretable or easily attributed. In contrast, the abuse of other substances such as alcohol, tobacco, marijuana, cocaine, and heroin surely has dominated the field of research. The numbers of users of these substances and the associated medical, social, and criminal consequences of abuse have been and continue to be well documented and are not at all subtle. The focus of attention overwhelmingly is on the side of these substances, especially in the United States.

Another reason for the dearth of information probably has to do with a disdain for the use of inhalants—mainly glue, gasoline, paint thinner, and other solvents. Drug users themselves regard inhalant use as a lowly behavior with an associated subculture that is unappealing to many. Passing a rag soaked with paint thinner and sticking one's face in a paper bag to sniff glue hardly are behaviors that stir the seasoned drug user; at the very least, it is considered "kid stuff' (McSherry 1988).

SOME METHODOLOGICAL ISSUES

Irrespective of the possible reasons offered for the lack of information, there are specific and objective methodological issues that need to be addressed if epidemiologic research into inhalant abuse is to be improved. Using New York State's three-pronged research approach to drug abuse epidemiology as a context for discussion, the following sections deal with methodological issues having to do with: (1) direct population surveys, (2) indirect indicators, and (3) ethnographic research.

DIRECT POPULATION SURVEYS

Cross-sectional, anonymous surveys of the population—especially of youth—have been effective in identifying the existence of inhalant abuse. Periodically, the Bureau of Applied Studies of New York State's Office of Alcoholism and Substance Abuse Services (OASAS) conducts a survey of youth, which includes two components: (1) a stratified sample of school students throughout the State (about 35,000 students participated in 1990 when the most recent survey was conducted), and (2) youth residing in a sample of residential facilities supervised by the State's Division for Youth (DFY) (703 adolescents in 12 facilities located throughout the State participated in the 1990 survey). The survey findings for the school students show that inhalants rank as a major substance of use for young people (figure 1), that very young students are likely to use (figure 2), that over time the finding that about one in five

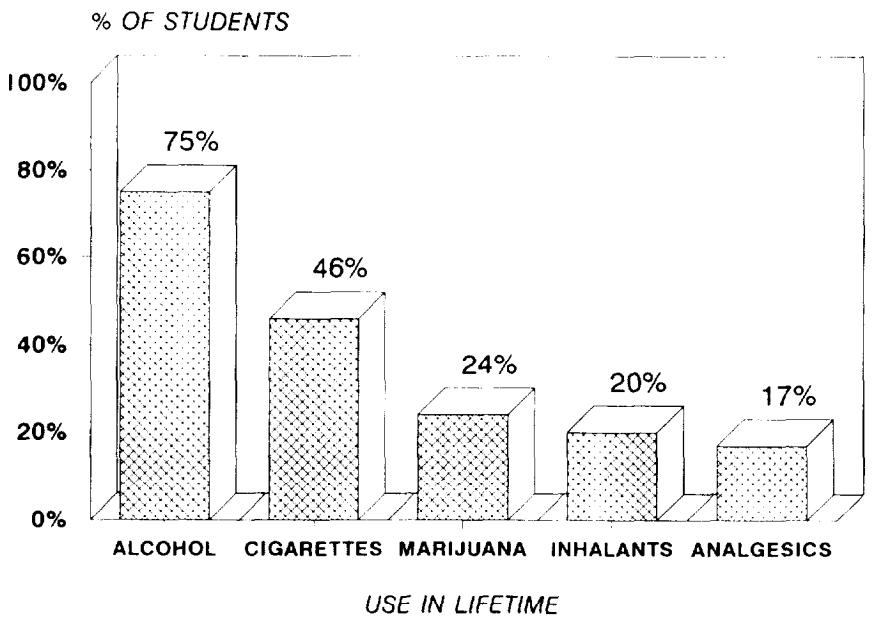

FIGURE 1. *The ranking of major substances used by 7th-12th graders in New York State, 1990.*

SOURCE: New York State Office of Alcoholism and Substance Abuse Services.

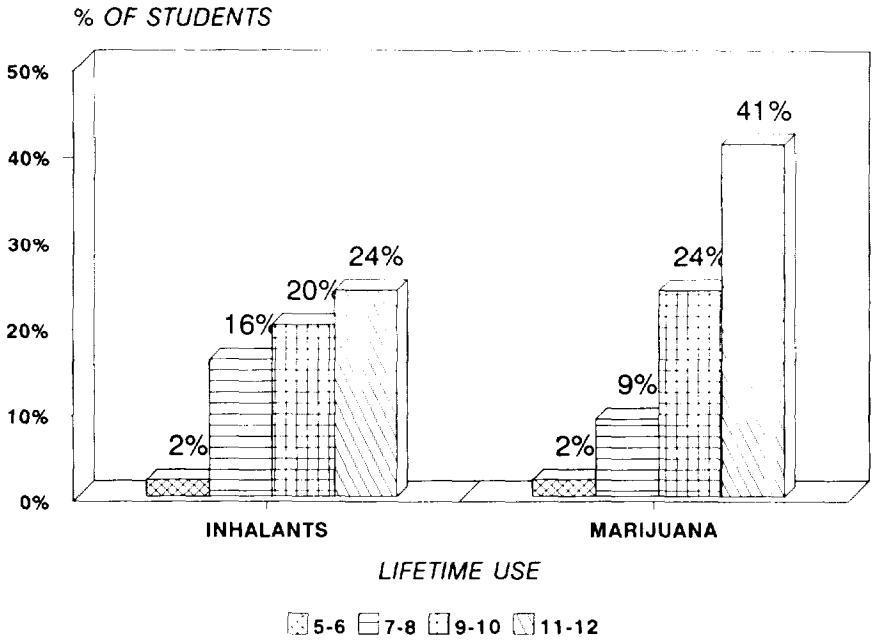

FIGURE 2. *Inhalant use and marijuana use by grade level in New York State, 1990.*

SOURCE: New York State Office of Alcoholism and Substance Abuse Services.

students is likely to try an inhalant is very stable, and that inhalant use and other problem behaviors are correlated among students (New York State Division of Substance Abuse Services 1991).

Some methodological issues that do arise in survey research on inhalant abuse are the same as those arising in all survey research. These issues concern the wording of questions and the quality of sampling.

Given the variety of inhalants that may be used, an effort is made in the present survey of youth to ask about each one separately and specifically. Thus, the latest survey included the following three categories: (1) "rush or locker room (also butyl nitrite)," (2) glue, spray, or liquid (such as paint thinner and gasoline) and (3) nitrous oxide (also called laughing gas and whippets). Interestingly, a similar school survey was conducted in 1989 by other researchers that asked one all-inclusive question on the use of "Glue, inhalants (Rush, Snappers)" (Kandel 1990).

The findings in the two surveys were quite different. Whereas the 1990 survey yielded a rate of 20 percent for lifetime use of one or more inhalants, the 1989 survey yielded a comparable rate of 6 percent. These rates represent unduplicated counts of inhalant users. When nitrous oxide findings—which were omitted in the 1989 survey—are excluded from the calculation in the 1990 survey to make questions more comparable, the unduplicated rate of "ever use" is reduced somewhat to 16 percent of the student population in grades 7 through 12—still more than twice the rate of 6 percent found in the latter survey.

Sampling issues also are a major research consideration, especially the size of the sample and geographic distribution of the sample. In OASAS surveys of school students, an extremely large number of students were surveyed and stratified by region in the State. The large number assures an acceptable margin of error and permits depth of analysis. The geographic distribution finds disparate rates of use in New York State from a low rate of 16 percent for New York City students to a high rate of 26 percent of students ever using inhalants in some relatively rural upstate regions.

An interesting anomaly was found in a comparison of rates of inhalant use between the sample of school students and the sample of DFY residents (figure 3). For every substance queried, the DFY sample surpasses the school students in rates of use. The one exception is the category of inhalants, with the school students showing 20 percent lifetime prevalence and the DFY residents showing 15 percent lifetime prevalence. Although the survey found that students' inhalant use correlates with other problem behaviors, it is likely that ready availability of other substances—especially in New York City—may have been a factor in explaining the lower rates of inhalant use among the DFY residents (New York State Division of Substance Abuse Services 1991). Most DFY residents are from New York City.

Surveys of adults also raise somewhat similar methodological issues. OASAS periodically conducts surveys of adults, including a telephone household survey and a survey of adults in public shelters and low-price hotels.

A very important issue in adult surveys is missing whole subpopulations of users in the conduct of traditional household surveys. Given the fact that many of the more intensively involved drug users do not have stable households and that others have no households at all, household surveys,

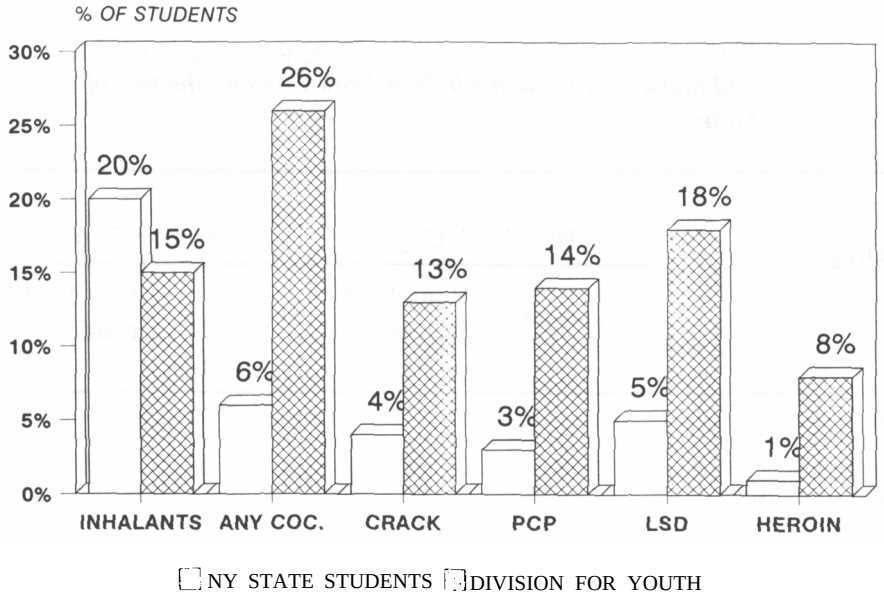

FIGURE 3. *Lifetime substance use: New York State students versus residents of DFY facilities, 1990.*

SOURCE: New York State Office of Alcoholism and Substance Abuse Services.

even if they are completely accurate, always provide underestimates of the extent of substance abuse; for inhalant abuse, the underestimate is particularly severe.

To address the issue of coverage, an attempt has been made to survey an element of the nonhousehold population, those occupying public shelters and low-price hotels. Table 1 shows a gross comparison of recent drug use rates or use in just the 6 months prior to the survey for transients and household residents in New York City and in the rest of the State. Overall, the transient population survey showed relative rates that were much higher than the household. Three percent of the New York City sample of transients had reported using inhalants in the last 6 months, compared to less than 0.5 percent of New York City household residents; the comparable rates in the rest of the State were 4 percent versus less than 0.5 percent, respectively (New York State Division of Substance Abuse Services 1988).

TABLE 1. *Recent use[a] of illicit substances among adults in New York State, 18 years and older, 1986: Comparison of "transients" and household residents in New York City and the rest of the State.*

Drugs	New York City		Rest of the State	
	Transients	Household residents	Transients	Household residents
Percent with recent (past 6 months) use:	%	%	%	%
Marijuana	40	11	31	9
Cocaine	27	5	11	3
PCP (angel dust)	4	*	1	*
Hallucinogens[b]	2	*	1	*
Inhalants[c]	3	*	4	*
Heroin	9	*	2	*
Illicit methadone	3	*	1	*

Example of how to read the table: In New York City, 27 percent of the transients and 5 percent of household residents reported use of cocaine during the past six months.

KEY: * Less than 0.5 percent.
a Recent use is in the 6 months prior to the survey.
b Includes LSD, mescaline, and psilocybin.
c Includes aerosol sprays, industrial solvents, and amyl/butyl nitrites.

Another issue always of concern in surveys is the wording of questions. In asking adults about behavior that may have occurred early in their lives, such as the use of inhalants, the problem of recall and, perhaps, the

embarrassment of reporting such a practice in a person-to-person survey situation are factors that may contribute to extraordinarily low rates of "ever use" among adults, even though 20 percent of adolescents report the practice. In an upcoming survey, there will be sensitivity to this issue. Instead of simply asking, "Have you ever in your lifetime tried an inhalant to get high or feel good?" as was done in the past, the question will be worded, "Have you ever in your lifetime, even as a child, tried an inhalant to get high or feel good?

INDIRECT INDICATORS

Direct surveys of the population can be extremely useful in estimating prevalence and incidence and in identifying populations at risk. Given the expense and time necessary to conduct surveys, surveys are conducted only every 5 years or so in New York State. In the interim and in an ongoing fashion, trends are tracked in a variety of indirect indicators of substance abuse. These are largely indicators of consequences associated with the drug involved, such as arrests, hospital emergency room episodes, deaths, and admissions to treatment programs.

Emergency room episodes and deaths are the strongest *leading* indicators, identifying sudden outbreaks and new or changing patterns of use. Treatment admissions are the strongest *lagging* indicator, surfacing usually at a later stage in a cycle of drug-using behavior. Arrests as an indicator are likely to occur somewhere in the middle of the cycle. Of course, drug-related arrests depend on the type of drug involved, associated laws, and police awareness.

Each of these indicators has been helpful in tracking and describing cocaine, heroin, and marijuana trends. In an effort to identify trends in inhalant use or the consequences of inhalant use or abuse, however, these indicators have little utility. For instance, the Federal Drug Abuse Warning Network reporting of drug-involved hospital emergency room episodes finds that less than one-half of 1 percent of the approximately 400,000 episodes in 1992 involved inhalants; none were reported for the two metropolitan areas represented in New York State (National Institute on Drug Abuse 1992). Among admissions to treatment programs in New York State, about one-half of 1 percent (33 admissions) of 56,000 admissions in 1992 reported inhalants as the primary drugs of abuse (New York State Office of Alcoholism and Substance Abuse Services 1993). These low numbers, despite the medical consequences, probably

are due to the fact that inhalants as a category of substances are not easily or routinely screened for, not inquired about, and, possibly because of embarrassment, not even reported by patients or associates.

ETHNOGRAPHIC STUDY

Given the hidden, stigmatized, and illegal nature of drug using and selling, ethnographic study often yields insights that are not gathered easily by other research methods. Nevertheless, aspects of inhalant use make even ethnographic strategies difficult to use.

OASAS, for example, has maintained a Street Studies Unit for more than 15 years. This unit consists of several men and women—African-American, white, and Hispanic—who have had a history of drug abuse. Much of their job entails the use of observation and semistructured interviewing at the major drug copping areas throughout New York City. Over the years, they have identified trends in the availability and patterns in the use of cocaine, heroin, marijuana, hallucinogens, and a variety of psychoactive prescription drugs. Most inhalants, especially glue, solvents, and gasoline, are available through legal channels and are not sold at drug-copping sites and, therefore, are difficult to observe. However, there are tell-tale sequelae that members of the Street Studies Unit have observed in recent years that do indicate some inhalant activity. This involves, most recently, cartridges of nitrous oxide found in the street. These cartridges are available in head shops or paraphernalia shops, as well as department stores, selling for less than $5.00 for a box of 10. They have been popular in Greenwich Village and can be found around colleges located in the City. Otherwise, the Street Studies Unit has had little contact with inhalant users around town.

RECOMMENDATIONS FOR IMPROVING THE QUALITY OF RESEARCH

Obviously, many ways in which epidemiologic research is carried out do not yield sufficient data for tracking and gathering meaningful information on inhalant use and abuse. Improvement and change surely can take place. Improvements can be made in research methods currently in use, as well as in the pursuit of some new and innovative approaches that may be more suitable to this and, perhaps, other categories of drug use.

First, experience has shown ways to sharpen research methods to improve the quality of information gathering. In survey research, for instance, asking separate questions about specific inhalants yields rates of use that probably are more accurate and allow a greater depth of analysis. Sampling also is a major concern. Often the most hidden and hardest-to-reach populations are susceptible to this type of drug use. Findings from the study of a transient adult population cited above are a prime example (New York State Division of Substance Abuse Services 1988).

Indicators that have been used traditionally in drug abuse research have little utility in tracking inhalant abuse, as discussed in a previous section. Very different indicators may be more appropriate. For instance, ethnographic indicators or indicators that emerge from certain networks and telephone hotlines may be more sensitive in picking up information about inhalant use, the occurrence of local outbreaks, subpopulations using them, and consequences of use.

An interesting indicator that may have ethnographic value for local areas is the Regional Alcohol and Drug Awareness Resources network sponsored by the Federal Government's Center for Substance Abuse Prevention. The network consists of State clearinghouses of alcohol and drug abuse information, specialized information centers of national organizations, and Department of Education Regional Training Centers, whose purpose is to share a variety of information that includes electronically transmitted queries and responses. Given an increasing concern about rates of youthful inhalant abuse by the public and the lack of information, it is likely that inquiries of such a network may be worth monitoring. Monitoring the requests for information on inhalants may prove to be a useful indication of types of inhalants being used, where local outbreaks are occurring, and which subgroups in the population are involved in use.

The paucity of appropriate indicators may point to the inability of selected segments of the population to vocalize problems concerning themselves. Vocalization usually emanates from their advocates. In an effort to think creatively, one effort might be to encourage or promote "1-800" telephone hotlines or information lines on alcohol and other drugs used by youngsters. Although OASAS has maintained a 7-days-a-week, 24-hour, "1-800" information line for more than a decade, adults usually are the callers. Less than 1 percent of the callers to this telephone line have asked about inhalants. The "1-800" telephone

number usually is advertised in telephone directories and inserts in telephone bills. If, however, this nonintimidating information line that maintains anonymity for the caller were to be advertised for children, it might yield a whole range of concerns, including indications of inhalant use.

In view of the fact that users of different types of inhalants appear to be very different (e.g., users of volatile solvents versus users of nitrites) with very different motives for use and different demographic characteristics, more use of focus groups might be helpful. The convening of several different focus groups might help to clarify conceptions of inhalant abuse and point to epidemiologic cues that, in turn, might provide more basic insights and suggest indicators to be monitored.

The several focus groups might start from the type of inhalant used. On one hand, there are the cheap, readily available volatile solvents, including gasoline, paint thinner, toluene, and aerosol sprays. On the other hand, there are amyl/butyl nitrites and nitrous oxide, which are more expensive and less accessible. Immediately, the types of users differ. Users of the cheap, readily available inhalants are likely to be youngsters, between the ages of 11 years and 13 years, typically in the initial phases of drug use; indigent inhalant-abusing adults; and destitute "street" youth in villages and urban slums throughout the world. In contrast, users of the more expensive and less accessible inhalants are likely to be medical and dental professionals who may use nitrous oxide to relieve stress, as well as male adolescents and homosexual males who use nitrites as sexual enhancers. The areas of inquiry might include:

- Users' preferences for inhalants and the full range of associated effects,
- Relative status of the inhalant vis-à-vis other classes of drugs used,
- Situational context of use and subcultural norms, and
- Perceptions of risk and harm.

Although it is not clear how representative these groups are of the larger universe of inhalant users, the findings might clarify the motives and consequences of use and suggest epidemiologic ways of monitoring

Finally, the studies that already have been conducted and the chapters that appear in this volume demonstrate that very basic epidemiologic research questions still remain and need to be addressed. These are questions fundamental to an understanding of the behavior, and they touch each of the elements of the epidemiology triad of agent, host, and environment. For instance, the issue of "agent" needs to come to be considered in the context of definitional problems related to determining what constitutes this category of substances and should attempt to improve understanding of inhalation as a mode of administration; identification of laboratory tests that biologically confirm the use of an inhalant; and the interaction of inhalants—however they are defined—with the use of other substances. The issue of "host" would involve investigation into predisposing biological factors and psychological vulnerabilities that exist for specific persons or populations, the life history factors that might be related, and inhalant use as a marker for other problem behaviors. The "environment" issue would focus on the relative risks of socioeconomic conditions; the effects of legal, cultural, and subcultural norms; and the local situation and fad-like conditions that can precipitate outbreaks.

In any case, there has been a raising of consciousness over the past few years. Educators, parent groups, and community agencies are much more cognizant of the problem of inhalant abuse. For instance, when the findings of the last New York State school survey were released, it was quite clear that strides had been made in reducing rates of illicit drug use, such as marijuana use and cocaine use, but the use of inhalants and the nonmedical use of prescription analgesics had remained relatively unchanged. These findings were enough to signal a change in direction in school curricula to focus more on educating children about seemingly benign substances very close to home. Educational videotapes also have become available recently for children, as well as for adults, graphically describing the problem, the effects, and ways to get help. Informative brochures have become available and are being circulated. Groups have formed specifically around the problem of inhalant abuse, especially solvent abuse. This interest and activity itself will exert pressure to know more and understand better this intractable problem.

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Inhalants: A Policy Analysis of the Problem in the United States

Henrick J. Harwood

Inhalant abuse has been an element of the drug abuse problem for more than 30 years. Attention to the problem, if not the nature and extent of the problem, has waxed and waned over this time as the public and media repeatedly take note of and then forget the problem of inhaling or sniffing products like glues, gasoline, paints and varnishes, assorted aerosolized products, and other products containing volatile aromatic constituents. The problem has been addressed sporadically by the Federal Government, but most of the effort and attention toward inhalants has been shown by State legislatures. This chapter summarizes the findings of a comprehensive study on the nature and extent of the problem and the alternative policy approaches that have been used to address inhalants in the United States (Harwood et al. 1993).

The overall level of abuse of inhalants appears to have been refractory to most initiatives undertaken to date, although there seems to have been some limited product-specific successes. There are four general policy approaches that can be, and have been to various extents, taken to address the problems of inhalants. These are:

- Change products;
- Restrict access to abusable products;
- Implement prevention efforts targeted at inhalant abuse; and
- Develop and deliver treatment for inhalant abuse.

A discussion of the advantages and weaknesses of each of these strategies is found later in this chapter. In general, these policies can be characterized as product oriented (or supply reduction) and consumer oriented (demand reduction). Unfortunately, there has been virtually no attempt to systematically or rigorously evaluate the success of these alternative approaches at addressing inhalant abuse. Probably the strongest evidence of policy utility or futility is the finding that most policy initiatives aimed at products, producers, and retailers have not been enforced. It appears that product-oriented policies cannot be implemented or are not enforceable without significant expense. The situation with consumer-oriented or demand reduction policies is in some

senses worse: There have been very few prevention or treatment interventions directed at the inhalant programs, and there has been no effort to evaluate what little has been done.

There is no explicit Federal policy with respect to inhalant abuse. Only a single act of Congress has been passed (Public Law 100-690), and that act dealt with only one small class of inhalants (nitrites) under the authority of the Consumer Product Safety Act. The only regulations specifically focusing on inhalant abuse were requirements for labeling of pressurized food and cosmetic products. There have been a few narrowly interpreted product-specific Federal regulatory actions for abused products over the past 25 years. However, there has been no systematic examination of the nature and extent of the problem, no effort to identify and evaluate policy options, and certainly no movement to articulate a coherent Federal posture on this matter. Federal policy on inhalants has been formulated by default: The Federal Government rarely has used regulation to either change products or restrict access to specific products in order to reduce abuse of inhalants.

It should be noted that this is in contrast to Federal policy with respect to other consumer product and occupational safety issues, where there has been extensive legislation and regulation by agencies including the Consumer Product Safety Commission (CPSC), the Food and Drug Administration (FDA), and the Occupational Safety and Health Administration (OSHA).

In contrast, 43 States have passed statutes specifically directed at inhalants. This is not to say that the States have arrived collectively at a coherent inhalant abuse policy, for this is far from the case. States have written and in some cases implemented (or not implemented) a vast array of policies with respect to inhalants:

- 41 States have criminal statutes regarding abuse of inhalants;
- 31 States have business regulations on product formulation or access; and
- 10 States have prevention or treatment-related statutes.

Most laws attempt to limit access to inhalable products or change inhalable products. Fewer States have legislated on prevention or treatment initiatives or both. Supply reduction efforts have

predominated, but it seems clear that these various efforts have not achieved notable success, since few specific policies have been widely replicated across multiple States.

Law enforcement and business officials advocate that more effort should be put into prevention efforts. However, there is only theory and little evidence to guide how this should be undertaken. Demand reduction efforts targeted at inhalants have been rare, and when performed they have not been evaluated. General drug abuse prevention efforts often ignore inhalants. The recent rigorous prevention evaluations (ALERT and Project STAR) have not examined impacts on inhalant abuse (Ellickson and Bell 1990; Pentz et al. 1989).

BACKGROUND ON THE PROBLEM

Inhalant abuse is a persistent part of the drug abuse problem in the United States. In the face of major progress against the abuse of illicit drugs over the past 13 years, there has been no apparent progress against inhalant abuse. National rates of use among adolescents and adults have remained relatively stable over this time period (figure 1). In 1991, an estimated 1.8 percent of adolescents aged 12-17 years used inhalants during the 30 days prior to the survey; this is not significantly different from 2.0 percent in 1988 and 2.2 percent in 1990. About 1.5 percent of young adults aged 18-25 years in 1991 used inhalants during the prior 30 days (National Institute on Drug Abuse 1993).

National rates and trends do not adequately characterize the nature, extent, or impact of inhalant problems nor the attention dedicated to this problem. Inhalants often are the first drugs abused by adolescents (including alcohol and tobacco), and Oetting and colleagues (1988) have concluded that inhalant abuse often is symptomatic of or correlated with emotional problems. There is a great need to develop and test theories about the causes (i.e., etiology) of inhalant abuse, as well as the definition of inhalant abuse (Beauvais and Oetting 1987). Such information is fundamental to the development of new and ultimately effective strategies against inhalant abuse. Interested readers are directed, for example, to National Institute on Drug Abuse Research Monograph 129 (Sharp et al. 1992). In addition, while inhalant abuse is endemic across the Nation, it has been detected in higher rates and even in epidemic proportions in some communities with a large minority population, particularly among

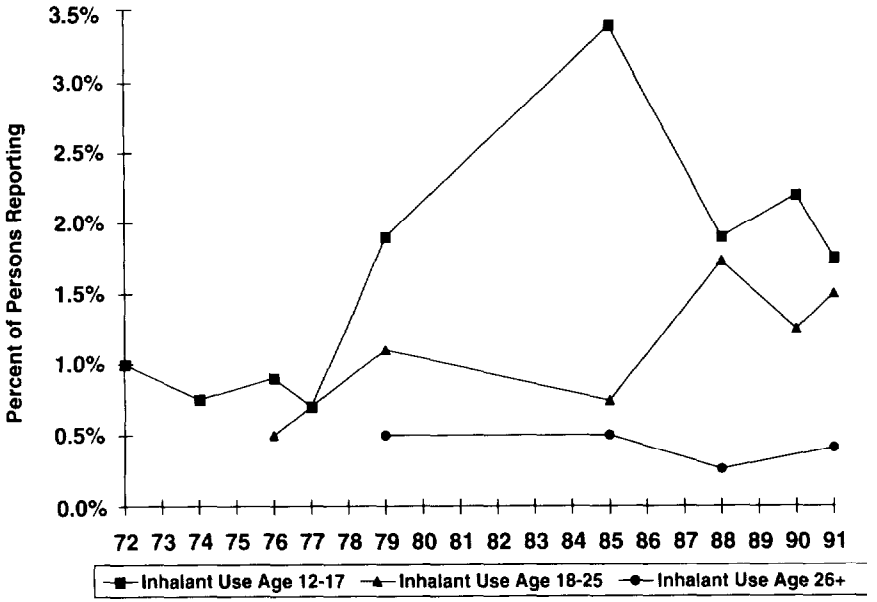

FIGURE 1. *National Household Survey on Drug Abuse, 1972-1991. Reported inhalant use in past month.*

Native Americans and Hispanics (Beauvais and Oetting 1988; Mata and Andrews 1988; Smart 1988).

Public attention nationally and at the State and community levels is episodic. An episode typically is initiated by the media publicizing a series of inhalant-related deaths and injuries of adolescents associated with a particular product or type of abusable product (e.g., glue and metallic paints). Glue sniffing as described in *Parade* magazine was the first and best-remembered media-publicized inhalant "epidemic," but numerous States and communities subsequently have "discovered" inhalant abuse. There is little evidence that inhalant abuse dramatically waxes or wanes before or after its "discovery."

The most difficult facet of the inhalant problem to confront is the fact that inhalants are ubiquitous. Abusable substances are used in and important to the function of thousands of consumer and industrial products, such as fuels (e.g., gasoline), glues and adhesives, paints, varnishes, typewriter correction fluid, nail polish remover, gas lighters, pressurized food products, and aerosolized cosmetic products. These products contain volatile substances such as benzene, toluene, butane, acetone, nitrous oxide, freon, chlorofluorocarbons (CFCs), and others. Major product

classes containing these substances make up about $80 billion of the U.S. economy annually (Harwood et al. 1993).

While a series of deaths or injuries related to abuse of a particular product typically attracts public attention and motivates development of public policy (as exemplified in the State statutes that have been passed on this subject), a policy that focuses on only one or a few products is unlikely to stop or deter individuals who want to abuse inhalants because there are so many different products that are abusable (Watson 1986).

Inhalant abuse usually is of concern because of the tragedy of the youthful deaths that bring it to the public's attention. While inhalants are toxic to varying degrees, both acutely and chronically, it would appear that most inhalant-related deaths are due to trauma, injury, and violence during intoxication. Garriott (1992) found that 80 percent of inhalant-related deaths in Bexar County, TX, were due to suicide, homicide, and other traumas (the types of consequences that also are highly correlated with alcohol intoxication). The remainder were due to asphyxiation, or anoxia, or heart arrhythmias probably induced by abuse of inhalants.

Inhalant abuse needs to be put in the larger context of the illicit drug problem. Nationally, inhalant abuse is responsible for a very minor fraction of the measured consequences of drug abuse (figure 2). The Drug Abuse Warning Network (DAWN) reveals that only a small fraction of drug-related deaths and emergency room episodes involve inhalants. In the 20 DAWN cities making medical examiner reports, inhalants were mentioned in 1.0 percent of drug-involved deaths (National Institute on Drug Abuse 1991*a*). In the 48 contiguous States inhalants were reported in only 0.3 percent of all drug-involved emergency room episodes in 1990 (National Institute on Drug Abuse 1991*b*). Furthermore, the State Alcohol and Drug Abuse Profile of the public substance abuse treatment system estimated that only about 0.4 percent of clients admitted to drug treatment were admitted due to inhalant abuse (National Association of State Alcohol and Drug Abuse Directors 1991). Cocaine and opiates and, to a lesser extent, marijuana are involved in much higher proportions of drug-involved consequences. These findings should be given the caveat that it may be more difficult to recognize abuse of inhalants than other drugs.

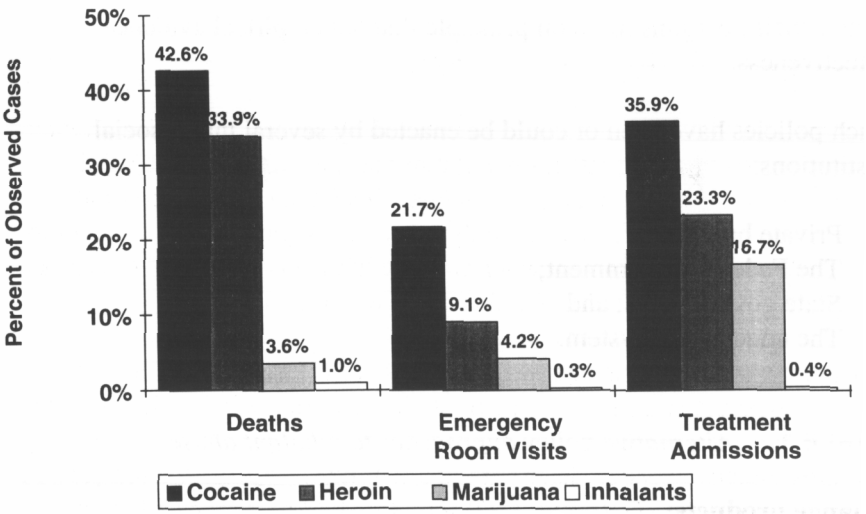

FIGURE 2. *Relative consequences of the use of cocaine, heroin, marijuana, and inhalants for 1990.*

OVERVIEW OF POLICY OPTIONS

There are a number of alternative but not mutually exclusive policy approaches to addressing inhalant abuse. These specific approaches can be grouped into four general categories (table 1). In general, combinations of all of these have been implemented at the local, State, or national levels and by private business. While these options have been attempted to varying degrees, there is little evidence that any of these policy alternatives have had a meaningful impact on overall rates of inhalant abuse. There have not been rigorous evaluations of these policy initiatives or tests of these strategies. Advocates of particular strategies justify their positions more on theory and principle than on empirical evidence of effectiveness. There are a number of alternative but not mutually exclusive policy approaches to addressing inhalant abuse; they fall into four categories (shown in table 1). In general, combinations of all of these have been implemented at the local, State, or national levels and by private business.

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justify their positions more on principle than on empirical evidence of effectiveness.

Such policies have been or could be enacted by several major social institutions:

- Private business;
- The Federal Government;
- State governments; and
- The educational system.

TABLE 1. *Alternative policy approaches to inhalant abuse.*

Change products:

- Voluntarily formulate products with no or minimal abuse potential:
- Ban abusable substances from use in legitimate products;
- Regulate (limit) the content of abusable substances in legitimate products;
- Add irritants to legitimate products containing abusable substances;

Restrict access to abusable products:

- Criminalize the abuse, possession, and/or distribution of inhalants;
- Restrict access to products containing abusable substances;

Implement prevention efforts targeted at inhalant abuse:

- Voluntarily place warning labels on abusable products;
- Place warning labels by regulation on abusable products; and
- Implement prevention/education programs specifically targeted at inhalants.

Provide substance abuse treatment to inhalant abusers.

The types of initiatives that have been undertaken by each of these institutions is discussed in turn, together with an indication of the extent of knowledge about the effectiveness of the various policies that have been initiated.

Business

Business-sponsored associations such as the Solvent Abuse Foundation for Education (SAFE) and the Chemical Specialties Manufacturers Association (CSMA) state that they strongly oppose abusive use of their products. For most products abusive use constitutes a negligible fraction of sales, but the bad publicity associated with abuse can be quite damaging. However, business even more strongly resists legislation of business regulatory approaches to reducing inhalant abuse. They favor policies such as prevention and education campaigns and advocate placing warning labels on abusable products.

Representatives of business argue that regulation of almost any kind would be burdensome to business and would result in poorer quality, more costly products for the vast majority of users of these products who purchase and use them safely. It is pointed out that there are thousands of abusable substances incorporated into tens of thousands of products and worth about $80 billion per year. The most ubiquitous and valuable of these products is gasoline.

Business does undertake actions voluntarily to address inhalant abuse. Warning labels voluntarily are affixed to many abusable products (although regulatory agencies require labels on certain types of products). Labeling also is in the self-interest of manufacturers since putting labels on products may help to indemnify manufacturers against product liability suits when serious consequences result from abuse of their products. While manufacturers' representatives such as SAFE and CSMA state that businesses have won all higher court decisions of product liability cases associated with deliberate abuse of their inhalable products, such cases sometimes are filed and often are settled out of court, albeit with no finding or admission of wrongdoing by the manufacturer or distributor.

A very few manufacturers of glue and typewriter correction fluid have added irritants such as "oil of mustard" to their products in order to discourage their abuse and have found that reported deaths and injuries subsequently declined. Still, businesses believe that voluntary

reformulation of products often is difficult to justify since a single manufacturer that reformulated its product would be at a major financial disadvantage, both from bearing the cost of reformulation and from consumer resistance to a product that performed poorly compared to those of competitors.

Businesses—through their own efforts and associations such as SAFE and CSMA—sponsor both inhalant abuse-targeted and general substance abuse prevention and education initiatives. CSMA has developed a videotape and print material about the dangers of inhalant abuse, and it has provided a copy of these to the 15,000 school districts across the Nation. These are good faith efforts by private business to assist in the effort against inhalant abuse. Still, the cumulative efforts of these two associations are no more than a few million dollars per year. These efforts are quite small in contrast to the Federal Government's investment of over $1.5 billion in drug prevention and education services per year and an additional $150 million per year in related research (Office of National Drug Control Policy 1992).

The Federal Government

The Federal Government has undertaken several specific actions that have limited the availability of particular abusable products over the past 25 years. These actions include:

1. A regulatory decision by the FDA in 1968 to return amyl nitrite to prescription status from over-the-counter status because it was being abused;

2. A decision by the Federal Trade Commission in 1969 to ban devices using CFCs to chill beverage glasses;

3. A decision by the FDA in 1974 to require that a warning label be affixed to pressurized cans of edible cooking oils and personal care products;

4. FDA establishment of standards for food products for purity and concentration of nitrous oxide;

5. Passage of an act of Congress in 1988 that banned use of butyl nitrites in room odorizers because they were often purchased for inhalation: and

6. An Environmental Protection Agency (EPA) regulation requiring use of CFCs to be phased out for environmental reasons; since one fabric waterproofing product was reformulated, deaths from abuse have reportedly declined.

For some of these actions, there is anecdotal evidence that deaths and injuries from abuse of these products declined. However, it is unknown what impact these limited actions have had on the rate of abuse of inhalants in general since there are so many products with abuse potential on the market, and abusers readily can switch products. Furthermore, there appear to be no studies on the impact of these specific product-oriented actions.

Many of the products that are abused fall under the purview of the CPSC. It has been argued that the CPSC currently has the authority to ban or require reformulation or labeling of products found to present safety risks. However, the CPSC has articulated the legal opinion that its authorizing legislation pertains to product safety when used "as directed" and under "reasonably foreseeable handling or use." The latter term is interpreted to exclude deliberate misuse of products for psychoactive purposes.

Federal legislation probably could be enacted that would ban or set concentration limits on the use of specific abusable substances in products or classes of products. There are several major precedents, For example, use of CFCs as a class of chemicals has been banned under the Environmental Protection Act due to their impact on the environment. The Occupational Safety and Health Act provides authority under which personal exposure limits have been set for use of toxic substances in the workplace (including a number of products abused as inhalants). The Food, Drug, and Cosmetic Act forbids food from being sold that contains any detectable concentration of a substance found to be carcinogenic.

The argument against product-oriented regulation to change products are that the costs of such an approach are much greater than the potential benefits. Firstly, only a tiny fraction of these products are abused, and the measured consequences of abuse appear to be small. Secondly, the costs of reformulating products and decreased product functionality in use may be substantial. Development of new products could become more expensive and slowed substantially. Finally, major resources would be required to enforce the regulations since there are so many substances

with abuse potential, and additional products and substances are being developed virtually every day.

State Governments

When State legislation is used to address inhalant abuse, law enforcement and business regulation have been the primary focuses of efforts. Out of 43 States that have enacted some kind of legislation pertaining to inhalant abuse, 41 have enacted provisions with a law enforcement approach, and 31 have enacted a business regulation approach. In contrast, only 10 States have enacted statutes that specifically contain prevention or treatment policies (see tables 2-6).

No formal evaluations have been identified of the effectiveness of these State initiatives. However, Mr. Hugh Young, the Executive Director of SAFE, states that the business regulation policies are not enforced and that there have been no successful prosecutions under these laws. Statutes criminalizing abuse of inhalants (36 States) arguably have been enacted primarily to allow prosecutors and judges to divert inhalant abusers into treatment. Again, there are no data regarding the frequency with which this has been done. The national drug treatment studies report only between 2,500 and 5,000 admissions of inhalant abusers to treatment in 1990 (Brandeis University 1992; National Association of State Alcohol and Drug Abuse Directors 1991).

Seven States enacted laws calling for abusable products to add irritants in order to discourage abuse of the products (table 4). In Texas and New York, these statutes charged State commissions or agencies with identifying and publishing lists of such “additives” that were approved as safe for this purpose. After substantial effort, the Texas and New York efforts to identify product additives were terminated because there was insufficient agreement on what would be safe and effective additives. For example, there is limited research showing that the only additive currently in use, oil of mustard, may be carcinogenic.

The 10 States that have enacted prevention or treatment provisions into law (table 1) arguably have done so mainly to guarantee that inhalant abusers had access to some kind of treatment. However, there is no treatment approach that specifically is designed for and demonstrated to be effective at treatment of inhalant abuse. The only options are generic drug-free residential and outpatient programs that treat polydrug abuse using cognitive and behavioral therapy. Again, so few inhalant abusers

TABLE 2. *Type of laws by State.*

State	Drug offenses	Business regulations	Drug prevention and treatment	Any law
Alabama	X			X
Alaska			X	X
Arizona	X	X		X
Arkansas	X			X
California	X	X		X
Colorado	X		X	X
Connecticut	X	X	X	X
Delaware	X	X		X
District of Columbia				
Florida	X	X	X	X
Georgia	X	X		X
Guam				
Hawaii	X	X		X
Idaho				
Illinois	X	X		X
Indiana	X			X
Iowa				
Kansas				
Kentucky	X	X	X	X
Louisiana	X	X		X
Maine				
Maryland	X	X		X
Massachusetts	X	X		X
Michigan	X			X
Minnesota	X	X		X
Mississippi	X	X		X
Missouri	X	X		X
Montana	X			X
Nebraska	X	X		X
Nevada	X	X		X
New Jersey	X	X	X	X

TABLE 2. *Type of laws by State (continued).*

State	Drug offenses	Business regulations	Drug prevention and treatment	Any law
New Hampshire	X	X	X	X
New Mexico	X	X		X
New York	X	X		X
North Carolina	X	X	X	X
North Dakota				
Ohio	X	X		X
Oklahoma	X			X
Oregon				
Pennsylvania	X	X		X
Puerto Rico	X	X		X
Rhode Island	X	X		X
South Carolina	X			X
South Dakota	X			X
Tennessee	X	X		X
Texas	X	X	X	X
Utah	X	X	X	X
Vermont				
Virgin Islands				
Virginia	X			X
Washington	X	X		X
West Virginia				
Wisconsin		X		X
Wyoming	X			X
		Total number		
54 States/territories	41	31	10	43

TABLE 3. *Type of drug laws by State.*

State	Illegal to abuse	Illegal to possess for abuse	Illegal to transfer for abuse	Illegal to transfer to mmors	Other
Alabama					X
Arizona	X		X	X	
Arkansas	X				
California	X	X		X	
Colorado	X				X
Connecticut	X	X	X		X
Delaware	X	X	X		
Florida	X	X	X	X	
Georgia	X		X	X	
Hawaii	X			X	
Illinois	X				
Indiana	X		X		
Kentucky					
Louisiana	X			X	

TABLE 3. *Type of drug laws by State (continued).*

State	Illegal to abuse	Illegal to possess for abuse	Illegal to transfer for abuse	Illegal to transfer to minors	Other
Maryland	X			X	
Massachusetts	X	X	X		
Michigan	X				X
Minnesota	X	X		X	
Mississippi	X			X	
Missouri			X		
Montana	X	X			
Nebraska	X		X		
Nevada	X	X		X	
New Hampshire	X	X	X		
New Jersey	X	X	X		
New Mexico	X	X		X	
New York	X	X	X		
North Carolina	X	X	X		

TABLE 3. *Type of drug laws by State (continued).*

State	Illegal to abuse	Illegal to possess for abuse	Illegal to transfer for abuse	Illegal to transfer to minors	Other
Ohio	X	X		X	
Oklahoma	X				X
Pennsylvania	X	X	X		
Puerto Rico			X		
Rhode Island	X	X	X		
South Carolina	X	X			
South Dakota	X				
Tennessee	X	X	X		
Texas	X	X	X	X	X
Utah	X	X	X		X
Virginia	X		X		
Washington	X	X	X		
Wyoming					X
			Total number		
41 States/territories	36	21	21	13	8

TABLE 4. *Type of business regulation by State.*

State	Illegal to sell for abuse	Illegal to sell to minors	Exemption for products with approved activities	Required to keep record of purchase	Warning labels or signs required	Other
Arizona	X	X	X	X		X
California		X	X			
Connecticut	X					
Delaware	X					
Florida	X					
Georgia	X	X		X		
Hawaii		X				
Illinois		X				
Kentucky	X					X
Louisiana		X				
Maryland		X				
Massachusetts	X		X	X		X
Minnesota		X			X	
Mississippi		X				X
Missouri	X					X
Nebraska	X			X		

TABLE 4. *Type of business regulation by State (continued).*

State	Illegal to sell for abuse	Illegal to sell to minors	Exemption for products with approved activities	Required to keep record of purchase	Warning labels or signs required	Other
New Hampshire	X					
New Jersey	X		X			
New Mexico		X		X		
New York	X					
North Carolina	X				X	
Ohio		X	X			
Pennsylvania	X					
Puerto Rico	X		X			
Rhode Island	X					
Tennessee	X					
Texas	X	X	X		X	
Utah	X					
Washington	X					
Wisconsin					X	
			Total number			
31 States/territories	20	13	7	5	4	7

TABLE 5. *Specified products regulated by State.*

State	Glues, model cements. and other adhesives	Paints, paint removers and paint thinners	Spray paints	Aerosol propellants	Toluene	Other specified chemicals	Other substances releasing toxic vapors
Arizona	X		X				
California	X	X			X	X*	
Connecticut					X	X	
Delaware							X
Florida	X				X	X	X
Georgia	X				X	X	
Hawaii					X	X	
Illinois					X	X	X
Kentucky	X	X					X
Louisiana	X						
Maryland	X					X	X**
Massachusetts	X						X
Minnesota	X		X				
Mississippi	X						
Missouri	X						
Nebraska					X	X	X
Nevada	X		X				X

TABLE 5. *Specified products regulated by State (continued).*

State	Glues, model cements, and other adhesives	Paints, paint removers and paint thinners	Spray paints	Aerosol propellants	Totuene	Other specified chemicals	Other substances releasing toxic vapors
New Hampshire							X
New Jersey	X	X			X	X	
New Mexico	X						
New York	X					X	
North Carolina						X	X
Ohio	X	X		X		X	X
Pennsylvania							X
Puerto Rico	X						
Rhode Island							X
Tennessee	X	X	X	X	X	X	
Texas	X		X		X	X	
Utah	X				X	X	
Washington					X	X	X
Wisconsin	X						
			Total number				
31 States/territories	21	5	5	2	12	16	13

KEY: * Nitrous oxide only; ** Statute specifically mentions fingernail polish.

TABLE 6. *Prevention curricula and inhalants.*

Name	Year published	Target grades	Program approach	Inhalant information: Student lessons	Inhalant information: Teacher/ parent only	Public health
American Red Cross	1991	K - 6	WA	No	No	P
Discover Skills for Life	1988	K - 6	K/A	Yes	No	T, L
DUSO	1989	K - 4	A	No	Yes	
Entering Adulthood	1990	9-12	WA	Yes	No	
Growing Up Strong	1989	2 - 3	A, alt, 0	No	Yes	C
Here's Looking at You 2000	1986	K - 1 2	WA, 0	No	Yes	P
Into Adolescents	1990	5 - 8	K/A, 0	Yes	No	
Learning to Live Drug Free	1990	K- 12	WA, 0	Yes	No	
McGruff	1986	K - 6	K/A	Yes	No	
Ombudsman	1987	5 - 9	K/A, alt	Yes	No	

TABLE 6. *Prevention curricula and inhalants (continued).*

Name	Year published	Target grades	Program approach	Inhalant information: Student lessons	Inhalant information: Teacher/ parent only	Public health
Paper People	1989	K - 2	A	No	No	
Preventing Inhalant Abuse	1991	3 - 6	WA, 0	Yes	No	T
Project DARE	1983	K - 9	WA, alt, 0	No	No	
Project LEAD: High Expectations!	1990	6 - 1 2	K/A, S	No	No	C
Project Pride	1988	K - 6	WA, 0	Yes	No	L
Team STARS	1989	6 - 8	WA	No	No	

KEY: K = kindergarten; A = affective only: Teaches students life skills (i.e., decisionmaking, coping, peer resistance); K/A = knowledge and affective: Lessons combine knowledge of substances with daily life skills; S = scare tactics used; alt = alternative: Provides students with positive alternatives to using substances; O = outside of classroom (parent/community/guest speaker); P = poison control: Addresses dangers of poisonous substances but not directly as inhalants; T = toxicity: Presents inhalants as toxic substances; L = legality: Addresses the legality of inhalant usage; and C = cultural component: Lessons are culturally/ethnically sensitive.

appear to enter treatment that programs may not know what specific approach is more appropriate for inhalant abusers.

Texas arguably has attempted the most broad-ranging efforts against inhalant abuse, including most of the interventions and policies described above, as well as instituted an innovative $25 license fee for commercial establishments to sell certain products containing inhalants. This has raised several hundred thousand dollars per year, which the Texas Commission on Alcohol and Drug Abuse uses to fund development of print materials about inhalants and to fund several local prevention campaigns. None of these efforts have been evaluated for effectiveness.

School-Based Prevention

Indeed, most schools have implemented antidrug programs (Office of National Drug Control Policy 1993). This conclusion is derived primarily from discussions with experts on inhalant abuse. Conversations with Federal and State regulatory and law enforcement officials revealed that they viewed product-oriented policies ineffective, and they believed there was more potential from prevention. Representatives of industry are adamant that education and prevention is the best prospect for reducing inhalant abuse, and they have supported development and distribution of such material.

There is strong agreement that prevention and education, in particular school-based prevention and education, should be either one of a number of elements or the major element in the effort against inhalant abuse. However, this resolution appears to be poorly implemented in practice. Inhalant abuse is at best a minor part of school-based prevention programs but, more importantly, inhalant abuse is not even addressed in some recently published prevention curricula. In a review of the 16 school-based prevention curricula in the collection of and accessed through the National Clearinghouse on Alcohol and Drug Information, it was found that only eight communicate information on inhalants to the students (table 6). Another three provided information about inhalants only to the teachers or to parents. Five curricula included no information about inhalants. Only two curricula approached inhalants as a public health/poison control problem.

The literature on drug abuse prevention offers no guidance on how important it is to address inhalants in interventions. “Knowledge only” or “scare tactic” programs have been found often to lack credibility with

students and to be ineffectual (Tobler 1986). The major approaches in prevention interventions have combined objective knowledge about drugs and their effects with peer resistance skills, self-esteem, and other social skills that help youth deal with developmental challenges. These skills presumably help adolescents to avoid or resist use of substances ranging from alcohol and tobacco to marijuana, cocaine, and inhalants. Still, it is unknown whether omission of information about inhalants weakens the impact of prevention programs in general or on inhalant abuse specifically.

OVERVIEW OF POLICY OPTIONS

There is no articulated national or Federal approach to the inhalants problem. Federal policy has evolved by omission or analogy, rather than commission. The National Drug Control Strategy barely mentions inhalants and contains no policy initiatives or recommendations specific to inhalants. There are product and occupational safety agencies (CPSC, FDA, OSHA, and EPA) with policies that address inhalant abuse only indirectly. The nationwide Drug-Free Schools program has resulted in a rapid proliferation of school-based prevention since it was passed in 1986 (Office of National Drug Control Policy 1993), but the Drug-Free Schools and Communities Act does not address inhalants, and many of the curricula being used by schools also leave out inhalants. Finally, there has been virtually no research on treatment for inhalant abuse.

In contrast, States have been very active in promulgating statutory initiatives against inhalants. These efforts, however, seem unlikely to have had significant impacts. Most State efforts have been product or supply reduction oriented, including criminalizing use of inhalants and making business regulations designed to limit accessibility of products. These policies have not been evaluated, but perhaps more importantly they generally are not enforced. Few States have undertaken prevention and treatment initiatives, such as the effort in Texas, but there is not even anecdotal evidence of effectiveness.

In general, there is insufficient information about the effectiveness, benefits, and costs of the four policy alternatives (i.e., change products; restrict access to abused products; implement targeted prevention; provide treatment) to make recommendations between the alternatives.

Policy Alternative 1: Change Products

This seems like a deceptively easy policy approach: Ban or limit the use of particular substances with abuse liability. However, there are thousands of substances and products with abuse potential. It conceivably would cost billions of dollars to reformulate these products, and then it seems probable that the products would be both less effective and more expensive. Many observers believe (although it is not proven) that users will switch to abusing other products if only the products found to be preferred by abusers are singled out for reformulation.

Several manufacturers have put additives or irritants into products. This may have reduced their abuse, but this possible outcome has not been rigorously studied or documented. Several State government efforts to mandate use of additives in abusable products failed because safe and acceptable additives could not be identified. However, it should be noted that there have not been significant efforts to identify or develop such additives.

Policy Alternative 2: Restrict Access to Abusable Products

States have enacted such restrictions a number of times. These provisions appear not to be enforced and probably are not enforceable without great expense.

Policy Alternative 3: Implement Prevention Efforts Targeted at Inhalant Abuse

The Drug Free Schools and Communities Act (DFSCA) requires each school district receiving Federal funding to implement comprehensive substance abuse programs for kindergarten through grade 12. Virtually all school districts have some kind of program in place. The DFSCA does not specify what should be in the programs. This study reviewed selected prevention curricula and found that inhalants are addressed by about half of the curricula and that very little information is conveyed in those programs. In fact, there is virtually no research base to justify whether or how inhalants should be dealt with in school-based prevention programs. There is a great need for professional consensus-building on both whether and how to include inhalants in such programs, as well as good research on these same topics.

Furthermore, because inhalant abuse has been reported to be epidemic in some communities—particularly in selected rural areas and ethnic minority neighborhoods—efforts should be directed at studying the dimensions of this problem and how it can be addressed at the community level.

Policy Alternative 4: Develop and Deliver Treatment for Inhalant Abuse

There is no treatment modality or defined therapeutic approach for inhalant abuse, and there are extremely few treatment programs directed at inhalant abusers. Nationally, there are only about 2,500 to 5,000 persons with primary inhalant abuse problems admitted to various types of substance abuse treatment programs per year. There is no knowledge about how these patients function in different kinds of treatment programs, what their retention is, or, most critically, what their outcomes are (Jumper-Thurman and Beauvais 1992). This is an area where research may have a payoff in terms of identifying practitioners and programs that see inhalant abusers and simply accumulating observational data before determining whether more rigorous research efforts should be implemented. Rigorous research may be extremely difficult to initiate given the small number of inhalant abusers that present for treatment annually.

FUTURE DIRECTIONS IN POLICY RESEARCH

It is a paradox of the inhalant problem that, even though inhalant policy initiatives (primarily State statutes) have been numerous, there have been virtually no evaluations performed. This study documented that 43 States have enacted at least some inhalant legislation. In addition, half of the school drug abuse curricula reviewed contained student components on inhalant abuse. However, there have been no studies of whether and how widely such policies have actually been implemented (not merely promulgated); nor have there been studies of what has been done in the course of implementation (process studies) or outcome studies of these initiatives. Consequently, this appears to be an open area for research.

While it is challenging to design and undertake research on inhalant policies, it would not be substantially different from performing evaluations of other antidrug initiatives. As noted above, such evaluations generally can be differentiated into process evaluations and

outcome evaluations. Ideally, such studies would be performed in tandem, although this is not strictly necessary.

It may be very useful simply to perform process evaluations of whether and how particular policies are implemented. Such studies perform an important public accountability function even without data on outcomes. For example, if a policy (established as a law or a matter of system policy by a policy board) mandates that inhalant abuse curriculum units should be incorporated into and delivered as part of school-based drug abuse prevention efforts, it would be useful and arguably important to examine whether and how this is accomplished. Process evaluations also should examine what is required to implement the policy in terms of resource, cost, time requirements, coordination, and other problems. All of these issues can and arguably should be addressed, even without examining whether the implementation is effective.

However, the objective of these initiatives is to reduce the incidence, prevalence, and consequences of inhalant abuse. Outcome studies should be performed to measure whether and how effective the respective policies are. The design and performance of inhalant abuse intervention outcome studies is not conceptually different from studies of interventions directed at other substances, although the generally low rates of incidence and prevalence observed among many demographic groups must be accounted for in the study design.

Furthermore, a process evaluation for a policy should be a critical accompaniment to any outcome study. It significantly weakens an outcome analysis of changes in incidence and prevalence across time or communities unless it is known whether and how the policy is implemented.

A perfect example is posed by the apparent lack of evaluations of school-based prevention policies. As noted above, prevention policies often are advocated by law enforcement and industry representatives who believe that the universal availability of products with inhalant abuse potential makes other strategies unworkable. Yet, there have not been studies on prevention and education. In fact, only half of the school prevention curricula reviewed in this study contained information about inhalants for students. No process evaluations were identified that examined whether or how instructors were delivering inhalant curriculum units, nor have prevention evaluations such as Project STAR in Kansas City, KS, and

Kansas City, MO, apparently examined their effectiveness against inhalant abuse.

Studies on inhalant abuse policies can and probably should be incorporated into larger evaluations. The inhalant problem does not exist in isolation from other aspects of the drug problem. Many of the instruments (e.g., prevention, treatment, and law enforcement) that can be used to address inhalant abuse are being used simultaneously to combat abuse of other drugs and alcohol—particularly among youth. While there are many unique aspects to the inhalant problem, it would be a lost opportunity to ignore the commonalities with other drug problems and fail to build on broader research initiatives.

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Recommendations and Conclusions

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This monograph underscores the urgent need for national and cross-national research to understand more comprehensively the patterns and trends, incidence and prevalence, etiology, resiliency and vulnerability factors, and social and health consequences of inhalant use and abuse in the world community. The findings presented in this volume document the endemic and global nature of this problem, and current research has demonstrated the severity of the medical consequences associated with the different classes of solvents and nitrites. At the same time, little systematic information exists in such vital areas as deaths associated with inhalant use from medical examiners or medical emergencies due to the use and abuse of inhalants. There is a need to develop surveillance systems in different parts of the world that can collect data on the health and social consequences associated with inhalant use and to begin efforts to establish comparability of findings. Natural history studies that can provide detailed information on the impact of inhalant use upon the physical and psychological well-being of users also are needed.

Similarly, information on the extent of the problem of inhalant use and abuse in many countries of the world also is needed. General population surveys and studies that collect comprehensive information on the prevalence and patterns of inhalant use and abuse to determine the severity and extent of the problem of inhalant use are needed. Concomitantly, ethnographic studies are needed to determine the extent and severity of inhalant use among special population groups such as street children, school dropouts, children who enter the work force at an early age, females of childbearing age, Native-American populations, and other hidden populations. Additionally, a rapid data system modeled after the National Institute on Drug Abuse (NIDA) Community Epidemiology Work Group could serve to collect information on the changing patterns of inhalant use and consequences associated with the use of the various classes of inhalants.

There also is a need for research to investigate the underlying factors responsible for inhalant use among individuals who are at high risk of using inhalants. Such research should explore individual vulnerability to

inhalant use spanning the different maturational periods of a person, beginning in early infancy and progressing through all stages of adulthood. Using this longitudinal approach, researchers can explore the impact that such factors as family dysfunction, peer pressure, lack of economic opportunity, gender, community factors, and larger societal factors have upon the onset of inhalant use, casual use, escalation to abuse, maintenance, development of dependence, cessation of abuse, and relapse.

Evaluation-driven research that will investigate the efficacy of school- and community-based prevention programs in preventing inhalant use and abuse also is needed. Whenever possible, these evaluation studies should be theory driven, not just an evaluation of an existing prevention program. Similarly, there is a need for research that will evaluate the impact of treatment programs and governmental policies geared toward reducing the use of inhalants among chronic inhalant abusers. Studies of this type should seek to evaluate what treatment models or approaches are the most cost-effective. This research also should focus on evaluating the effectiveness of Government policies to reduce the supply of solvents and nitrites in various countries throughout the world.

Inhalant use and abuse is a serious drug problem worldwide. Recent research advances in the United States and other countries have begun to provide initial information on the extent and nature of this problem. Efforts undertaken by various countries to prevent and treat inhalant use and abuse also demonstrate a serious intent to address this problem worldwide. Nevertheless, researchers currently lack data to understand comprehensively the magnitude and nature of inhalant use worldwide. More empirically based information is needed to develop effective intervention strategies and policies to address this problem. While current findings on the nature and extent of inhalant abuse are limited, an almost universal theme emerges regardless of country or region of the world: The population at greatest risk are the young, disadvantaged, and disenfranchised. The circumstances that have made this marginalized population uniquely vulnerable to inhalant abuse and its severe consequences also have made the need for research efforts and successful interventions all the more urgent.

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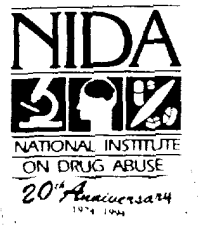

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