Volatile Solvents Abuse
A global overview
ABSTRACT

This report provides an overview of current views about the problem of the use of volatile substances to achieve intoxication in a variety of settings.

Volatile solvent (VS) use is a world-wide phenomenon, mainly (but not exclusively) occurring among young people. The associated health risks – even with experimental use – are considerable but are generally under-rated and under-researched. Polysubstance use (especially VS use combined with alcohol and tobacco) is common among VS users. They also frequently have other health problems. Among young people, it is often the first psychoactive substance they experiment.

Controlling the supply of volatile solvents may have some marginal effect on the public health impact of the problem, but on its own is not an answer. Many countries have some legal controls on supply, but few have sought to make possession or ‘misuse’ of volatile solvents a legal offence. Education for retailers helps to raise awareness of the problem.

Attempts to limit demand have largely been by educational means. However, educational programmes often exclude or marginalise education about VS use. While there are doubts about the effectiveness of education, ‘life skills’ approaches show the most promise. Education has more chance of success when it involves the whole community as compared to an isolated measure in the school setting. Other demand reduction approaches, such as the addition of compounds to alter the taste or smell of the products containing volatile solvents have very limited value, given the wide variety of products which contain solvents and are used for commercial purposes.

Reducing the harm of VS use among those who are using is sometimes controversial, but there are certain clear messages that may help to reduce VS-related mortality and morbidity. These must be tailored to the local situation, taking into account the substances used, methods and manners of use and the characteristics of the groups using them.

Treatment appropriate for VS users will depend partly on the extent of their use and related problems. Very little has been evaluated in the area of treatment for chronic VS use and dependence, therefore being difficult to recommend the most effective approaches. Detoxification is often not necessary for dependent users, but a period of ‘time out’ from everyday difficulties may assist the user in reducing or stopping use, but this depends on the local conditions and resources. Support from peers is important, and self-help approaches show great promise. Treatment methods devised for older users of other drugs will need adaptation if they are to work with this client group. New methods of working are still required. It is important to deal not just with the VS use, but also with the multitude of problems that a VS user may have, including marginalization and limited access to health care. Treatment should not focus only on the individual, but needs to address group and community issues as well. Group work and community-based approaches should therefore be further developed and evaluated.

Evaluation of treatment and prevention approaches is a neglected area, but given its complexities, this is not surprising. The multiple and evolving aims of projects make evaluation difficult, and identifying change requires measures that go beyond simple calculation of a reduction in, or abstinence from, substance use. Evaluation needs to be built in from the start of a programme and used to inform the intervention throughout. Evaluation is part of the process of intervention, helping to make it more effective.

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INTRODUCTION

This report provides an overview of the intentional use of volatile solvents (VS), often to achieve intoxication, which are commonly found in the home and workplace. In preparing this report, other reviews of the problem have been drawn on (e.g. Flanagan & Ives, 1994; Ives, 1990, 1995), as well as original research and case materials. The objective is to provide the basis for a comprehensive strategy, presented in part II of the report, to be tested in various countries, aimed not only to better understand the extent of the problems related to VS use but also to evaluate the effectiveness of a variety of approaches to reduce them at the national and local levels.

Compared to the use of other psychoactive substances, VS use has been relatively neglected, yet it is dangerous, with particular risks of death associated with acute intoxication. While most use is experimental and short-term, there are some people who use these products over a long period of time and in large quantities. VS use is particularly associated with young people, and in certain countries, with particular groups of young people such as street children and indigenous populations. Because there are many products that can be used to achieve intoxication which is readily available in the home and in a range of shops inexpensively, VS is often the first substance used by young people.

The WHO Substance Abuse Department (SAB)\(^1\) has carried out several projects in which the problems related to volatile solvents have been tackled. In 1992, SAB convened an international consultation on solvent abuse in Geneva. Representatives from seven countries, Bangladesh, Guatemala, Ivory Coast, Morocco, New Zealand, and Philippines attended. Current knowledge on the use of solvents in various countries and the national and local responses to the problem were reviewed, then a general framework for a comprehensive programme was proposed (WHO/PSA/93.8). However, due to lack of funds, no progress was made towards the implementation of the framework.

In 1992, SAB also started the Street Children Project. Phase I (WHO/PSA/93.7) studied the nature of substance use among 550 street children in 10 cities worldwide, indicating that volatile solvent use is very common and it is related to several health and social problems, including stigmatization and marginalization of users. In Phase II, which began in 1994, particular sites were chosen to assess the model for planning services and programmes for street children, as well as to develop a training manual for street educators, which included topics on volatile solvents. Phase III aims to take the project to scale, which may include the identification of model programmes, a strategy to provide training at a regional level, research and evaluation (WHO/PSA/96.12).

Finally, SAB initiated the Indigenous Peoples and Substance Use Project, with case study reports from 12 different indigenous communities (Berbers of Morocco; Canadian First Nations; Greenlanders of Greenland; Maoris of New Zealand; Mayas of Guatemala; Ogonis of Nigeria; Potiguara Indians from Brazil, Tongans of Tonga; Torres Strait Islanders of Australia; a Vietnamese hill tribe community and Yuracares of Bolivia). These described the nature, extent and context of substance use and problems of these communities and some of the responses which have been used. Phase II of the project was initiated in 1995 with a project planning meeting and the development of a comprehensive community-based action to prevent and manage substance use (WHO/PSA/96.12). Particularly among the Canadian First Nations, support given for interventions on volatile solvent use problems allowed the development and implementation of culturally appropriate treatment programmes in several indigenous communities across Canada.

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\(^1\)The WHO Programme on Substance Abuse (PSA) was renamed as WHO Substance Abuse Department (SAB) by the end of year 1998.
Terminology

In this report the term VS use is adopted to describe the intentional inhalations of a variety of volatile substances (most of them being organic solvents), for mind altering and recreational purposes. The term ‘inhalants’ has come to encompass a group of psychoactive chemicals that are defined by the route of administration rather than by their experienced effects on the central nervous system (CNS) action. Thus, such diverse substances as toluene, ether, and nitrites have been included under the rubric of inhalants because they are all taken in through the nose and mouth by inhalation. Their effects are rapid but of short duration, because the substances quickly enter the bloodstream via the lungs, from where they easily pass to the brain to act in several areas, producing their effects. Recovery is also relatively rapid as substances rest on the neuronal membrane only for a short period and go back to the blood stream and from there are finally metabolized in the liver. Thus one can get ‘high’ (intoxicated) several times over a short period of time. The effects of acute intoxication with volatile inhalants are similar to being drunk on alcohol, but some experience hallucinations or pseudo hallucinations as well.

Under certain circumstances of use, VS can cause symptoms that meet the criteria for a diagnosable mental health disorder. According to the ICD-10 terminology (International Statistical Classification of Diseases, 10th edition, WHO 1992), these include intoxication, harmful use, dependence and withdrawal. Without going into many details, below are brief definitions of key terms:

intoxication - an acute condition that follows the administration of a psychoactive substance and results in disturbances in the level of consciousness, cognition, perception, judgement, affect, or behaviour, or other psychophysiological functions and responses. Intoxication is highly dependent on the type and dose of substance and is influenced by the individual’s level of tolerance and other factors. The disturbances resolve with time, with complete recovery, except where tissue damage or other complications have arisen.

harmful use - a pattern of psychoactive substance use which is causing damage to health. Such damage may be physical (e.g. neuropathy, hepatitis), or mental (e.g. depressive episodes). Adverse social consequences often accompany harmful use, but are not required to be present. Nor are social consequences in themselves sufficient to result in a diagnosis of harmful use.

tolerance - a decrease in response to a psychoactive substance dose that occurs with continued use. Increased doses are required to achieve the effects originally produced by lower doses. Both physiological and psychosocial factors may contribute to the development of tolerance, which may be physical, behavioural or psychological.

dependence - repeated use with a cluster of behavioural, cognitive and physiological phenomena, including a strong desire to take the substance, impaired control over its use, persistent use despite harmful consequences, a higher priority given to drug use than to other activities and obligations, increased tolerance, and sometimes a withdrawal syndrome when the substance is discontinued.

withdrawal - a group of symptoms of variable clustering and degree of severity which occur on cessation or reduction of use of a psychoactive substance that has been taken repeatedly, usually for a prolonged period and/or high dose. The onset and course of the withdrawal syndrome are time-limited and are related to the type of substance and dose being taken immediately before cessation or reduction of use. Typically, the features of a withdrawal syndrome are the opposites of those of acute intoxication.

However, other terms related to the pattern and manner of using psychoactive substances are in common use in the literature related to volatile solvents, such as ‘solvent abuse/misuse’, functional/dysfunctional use, experimental/recreational/chronic use. In several countries, the practice is often referred to as ‘inhalant abuse’. Some terms refer to the use of particular products, such as ‘glue sniffing’, ‘gas sniffing’, ‘petrol sniffing’. (The English term ‘petrol’, rather than ‘gasoline’, is used in this paper.) There are also many slang terms in English, such as ‘huffing’. For convenience, the practice will be described as ‘VS use’ or ‘inhalation’; the products used
as ‘inhalable products’; and the people who engage in it as ‘inhalers’ (this is a better term than ‘sniffing’ as the products are inhaled through both the nose and mouth).

Such terms are used in the literature with less precision and therefore it is difficult to know whether a chronic solvent user is dependent or not, or has developed harmful consequences from such use. An experimental user may die from sudden sniffing death while dependent users may not show other physical harm related to solvent use. As it can be seen, these patterns may overlap or the same individual may have several patterns over time, therefore, they should not be viewed in a rank of severity in terms of impact on the individual’s health. The health consequences of VS use are difficult to relate to the dose, as dose is very difficult to quantify for an inhalable substance (except in laboratory-controlled conditions where dose can also be related to blood levels). Whenever possible, the most precise terminology was used in this report; however, when discussing the literature available, the terminology used in the original work has been maintained because of the difficulty in finding out the precise meaning of the term employed.

Products used

For products to be used as inhalant, they must contain a suitably volatile compound (or compounds) which is accessible in sufficient quantity free from particularly toxic components. These products include the following:

- volatile hydrocarbons such as those found in cigarette lighter refills, normally butane gas
- aerosol sprays (these formerly contained volatile CFCs, now the propellant is most often butane gas almost any aerosol may be used; hair-sprays and pain-relieving sprays are common)
- solvent-based contact adhesives (glues), especially those containing toluene
- correction fluids and thinners (until recently mostly containing 1,1,1-trichloroethane)
- dry-cleaning fluids
- the contents of some types of halocarbon fire extinguishers
- petrol (gasoline)
- liquefied petroleum gas (LPG), most often butane
- inhalational anaesthetics such as enflurane and nitrous oxide
- other halogenated solvents

See tables 1 and 2 for more detail of the chemicals involved.

Many aerosols formerly contained CFCs (chloro-fluoro carbons). Today, because of concerns about their effect on the ozone in the upper atmosphere with its implications for global warming, CFCs are used in only a few aerosols. Instead, butane gas is often used as the propellant. CFCs had the advantage of being nonflammable so the use of butane as a propellant poses additional dangers for unwary inhalers, particularly if they smoke while inhaling.

Petroleum distillates such as white spirit and paraffin (kerosene), and also alcohols and diols such as ethanol, 2-propanol, 2-methoxyethanol (methyl cellosolve) and ethylene glycol, are not sufficiently volatile to be used by inhalation.

However, amyl (pentyl) and isobutyl nitrites may be used by inhalation. The pharmacological effects (vasodilation), make them attractive to some male homosexuals, although there is some anecdotal evidence from the UK dance scene of more widespread use. Since their use is different from most other volatile substances, nitrites are not further discussed in this paper. For further details, see the review by Haverkos and Dougherty (1988).
<table>
<thead>
<tr>
<th>Hydrocarbons:</th>
<th></th>
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</thead>
<tbody>
<tr>
<td><strong>Aliphatic</strong></td>
<td>Acetylene</td>
</tr>
<tr>
<td></td>
<td>Butane&lt;sup&gt;1&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td>Isobutane (2-Methylpropane)&lt;sup&gt;1&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td>Hexane&lt;sup&gt;2&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td>Propane&lt;sup&gt;1&lt;/sup&gt;</td>
</tr>
<tr>
<td><strong>Aliphatic/aromatic</strong></td>
<td>Cyclopropane (trimethylene)</td>
</tr>
<tr>
<td></td>
<td>Toluene (toluol, methylbenzene, phenylmethane)</td>
</tr>
<tr>
<td></td>
<td>Xylene (xylol, dimethylbenzene)&lt;sup&gt;3&lt;/sup&gt;</td>
</tr>
<tr>
<td><strong>Mixed</strong></td>
<td>Petrol (gasoline)&lt;sup&gt;4&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td>Petroleum ethers&lt;sup&gt;5&lt;/sup&gt;</td>
</tr>
<tr>
<td><strong>Halogenated</strong></td>
<td>Bromochlorodifluoromethane (BCF, FC 12B1)</td>
</tr>
<tr>
<td></td>
<td>Carbon tetrachloride (tetrachloromethane)</td>
</tr>
<tr>
<td></td>
<td>Chlorodifluoromethane (FC 22, Freon 22)</td>
</tr>
<tr>
<td></td>
<td>Chloroform (trichloromethane)</td>
</tr>
<tr>
<td></td>
<td>Dichlorodifluoromethane (FC 12, Freon 12)</td>
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<tr>
<td></td>
<td>Dichloromethane (methylene chloride)</td>
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<tr>
<td></td>
<td>1,2-Dichloropropane (propylene dichloride)</td>
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<tr>
<td></td>
<td>Ethyl chloride (monochloroethane)</td>
</tr>
<tr>
<td></td>
<td>Halothane (2-bromo-2-chloro-1,1,1-trifluoroethane)</td>
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<td></td>
<td>Tetrachloroethylene (perchloroethylene)</td>
</tr>
<tr>
<td></td>
<td>1,1,1-Trichloroethane (methylchloroform, Genklene)</td>
</tr>
<tr>
<td></td>
<td>1,1,2-Trichlorotrifluoroethane (FC 113)</td>
</tr>
<tr>
<td></td>
<td>Trichloroethylene ('trice', Trilene)</td>
</tr>
<tr>
<td></td>
<td>Trichlorofluoromethane (FC 11, Freon 11)</td>
</tr>
<tr>
<td><strong>Oxygenated compounds</strong></td>
<td>Acetone (dimethyl ketone, propanone)</td>
</tr>
<tr>
<td></td>
<td>Butanone (2-butanol, methyl ethyl ketone, MEK)</td>
</tr>
<tr>
<td></td>
<td>Butyl nitrite&lt;sup&gt;6&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td>Enfluran (2-chloro-1,1,2-trifluoroethyl difluoromethyl ether)</td>
</tr>
<tr>
<td></td>
<td>Ethyl acetate</td>
</tr>
<tr>
<td></td>
<td>Diethyl ether (ethoxyethane)</td>
</tr>
<tr>
<td></td>
<td>Dimethyl ether (DME, methoxymethane)</td>
</tr>
<tr>
<td></td>
<td>Isobutyl nitrite ('butyl nitrite')&lt;sup&gt;6&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td>Isoflurane (1-chloro-2,2,2-trifluoroethyl difluoromethyl ether)</td>
</tr>
<tr>
<td></td>
<td>Isopentyl nitrite (3-methyl-1-butanol, isoamyl nitrite, ‘amyl nitrite’)&lt;sup&gt;6,7&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td>Methyl acetate</td>
</tr>
<tr>
<td></td>
<td>Methyl isobutyl ketone (MIBK, isopropyl acetone)</td>
</tr>
<tr>
<td></td>
<td>Methyl tert.-butyl ether (MTBE)</td>
</tr>
<tr>
<td></td>
<td>Nitrous oxide (dinitrogen monoxide, ‘laughing gas’)</td>
</tr>
<tr>
<td></td>
<td>Sevoflurane (fluoromethyl 2,2,2-trifluoro-1-(trifluoromethyl)ethyl ether)</td>
</tr>
</tbody>
</table>

**Notes:**

1. Principal components of Liquefied Petroleum Gas (LPG)
2. Commercial 'hexane' mixture of hexane and heptane with small amounts of higher aliphatic hydrocarbons
3. Mainly meta-xylene (1,3-dimethylbenzene)
4. Mixture of aliphatic and aromatic hydrocarbons with boiling range 40-200°C
5. Mixtures of pentanes, hexanes, etc. with specified boiling ranges (for example 40-60°C)
6. Abused primarily for its vasodilator properties
7. Commercial 'amyl nitrite' is mainly isopentyl nitrite but other nitrites are also present

<sup>1</sup> adapted from Flanagan & Ives, 1994.
<table>
<thead>
<tr>
<th>Product</th>
<th>Major volatile components</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adhesives:</td>
<td>Ethyl acetate</td>
</tr>
<tr>
<td>Balsa wood cement</td>
<td>Butanone, hexane, toluene &amp; esters</td>
</tr>
<tr>
<td>Contact adhesives</td>
<td>Toluene &amp; xylenes</td>
</tr>
<tr>
<td>Cycle tyre repair cement</td>
<td>Xylenes</td>
</tr>
<tr>
<td>Woodworking adhesives</td>
<td>Acetone, butanone, cyclohexanone, trichloroethylene</td>
</tr>
<tr>
<td>Polyvinylchloride(PVC) cement</td>
<td>LPG, DME and/or fluorocarbons</td>
</tr>
<tr>
<td>Aerosols:</td>
<td>LPG, DME and/or fluorocarbons</td>
</tr>
<tr>
<td>Air freshener</td>
<td>LPG, DME and/or fluorocarbons</td>
</tr>
<tr>
<td>Deodorants, antiperspirants</td>
<td>LPG, DME and/or fluorocarbons</td>
</tr>
<tr>
<td>Fly spray</td>
<td>LPG, DME and/or fluorocarbons</td>
</tr>
<tr>
<td>Hair lacquer</td>
<td>LPG, DME and/or fluorocarbons and esters</td>
</tr>
<tr>
<td>Paint sprayers</td>
<td>Anaesthetics/analgesics:</td>
</tr>
<tr>
<td>Anaesthetics/analgesics:</td>
<td>Nitrous oxide, cyclopropane, Diethyl ether, halothane, enfurane, isoflurane, DME, FC 22</td>
</tr>
<tr>
<td>Topical</td>
<td>Dichloromethane, methanol, 1,1,1-trichloroethane, tetrachloroethylene, toluene, bromochlorodifluoromethane, FC 11, FC 12</td>
</tr>
<tr>
<td>Dust removers ('air brushes')</td>
<td>Commercial dry cleaning and degreasing agents</td>
</tr>
<tr>
<td>Domestic spot removers and dry cleaners</td>
<td>Domestic spot removers and dry cleaners</td>
</tr>
<tr>
<td>Fire extinguishers</td>
<td>Domestic spot removers and dry cleaners</td>
</tr>
<tr>
<td>Fuel gases:</td>
<td>Domestic spot removers and dry cleaners</td>
</tr>
<tr>
<td>Cigarette lighter refills</td>
<td>Domestic spot removers and dry cleaners</td>
</tr>
<tr>
<td>'Butane'</td>
<td>Domestic spot removers and dry cleaners</td>
</tr>
<tr>
<td>'Propane'</td>
<td>Domestic spot removers and dry cleaners</td>
</tr>
<tr>
<td>Nail varnish/nail varnish remover</td>
<td>Domestic spot removers and dry cleaners</td>
</tr>
<tr>
<td>Paints/paint thinners</td>
<td>Domestic spot removers and dry cleaners</td>
</tr>
<tr>
<td>Paint stripper</td>
<td>Domestic spot removers and dry cleaners</td>
</tr>
<tr>
<td>'Room odorizer'</td>
<td>Domestic spot removers and dry cleaners</td>
</tr>
<tr>
<td>Typewriter correction fluids/thinners</td>
<td>Domestic spot removers and dry cleaners</td>
</tr>
<tr>
<td>Whipped cream dispensers</td>
<td>Domestic spot removers and dry cleaners</td>
</tr>
</tbody>
</table>

*adapted from Flanagan & Ives, 1994.*
Methods of use

Deep breathing through the nose and mouth is often involved when VS are used, not simply ‘sniffing’. Re-breathing exhaled air may add to the effect if the solvent vapour is contained in a plastic or paper bag. It is virtually impossible to assess dosages. On the other hand, the development of chronic toxicity is related not only to the compound(s) used, but also to the frequency and duration (in years) of the use. Some users inhale VS many times a day in concentrations several times higher than those found in the air of an industrial environment (e.g. in industry of paints, or shoes, where glue is used), for example, and over several years, which is partly why VS use is very different in its effects to industrial exposure to such substances. It has been reported that some users may consume four to six litres of adhesive weekly (Cronk et al., 1985).

The physical nature of particular products to some extent determines the mode of use. For example, contact adhesives are usually poured into plastic bags, the top is gathered together, placed over the mouth and the vapour inhaled. Cans of glue may be warmed so as to increase the amount of vapour available. Petrol and other relatively volatile products may be inhaled directly from a container, or poured onto fabric (a coat sleeve or handkerchief), or into cutaway plastic bottles, and the vapour inhaled. Plastic bags may be used by filling them from aerosol cans. These products may also be sprayed or released under bedclothes, or inhaled directly. Some users may put their heads completely inside a large plastic bag. Occasionally, inhalers have constructed airtight cabinets that they fill with fumes and get inside. Sometimes, bizarre devices are constructed in attempts to deliver the fumes more effectively.

Aerosols are usually liquid or solid suspensions supplied in cans containing a liquefied propellant gas. At room temperature one volume of liquid propellant may generate 200 to 300 volumes of vapour. Since it is the propellant that provides the intoxication, users prefer products that contain a high proportion of propellant (such as topical analgesic or pain relief sprays, deodorants and fly sprays) rather than those with a small proportion (e.g. shaving foam). If some constituents are not respirable (e.g. aluminum chloride, a toxic active ingredient in antiperspirants), then the product may be first bubbled through water, filtered through a cloth held firmly over the mouth, or sprayed into a plastic bag and the aerosol allowed to settle. Alternatively, the aerosol container may be inverted, allowing direct access to the propellant via the dip tube. VS use of nitrous oxide from cylinders designed for use, for example, with whipped cream dispensers has also been described. Use of propellants designed for power spray painting equipment is commonly reported from the USA and from Japan, but is rare in the UK.

The gas in cigarettes lighter refills, small blow torches and camping-gas stoves usually consist of butane with smaller amounts of isobutane and propane. These products are available in small (about 250 ml), inexpensive packs and are popular with some VS users. Cigarettes lighter refills may be used by simply clenching the nozzle between the teeth and pressing to release the gas. However, if the cans are tilted, a jet of fluid cooled to at least -40°C by expansion may be released. This may cause burns to the mouth, and possibly even to the throat and lungs. There is a risk of fire and explosion associated with the use of LPG cigarettes lighter refills.

Gas from larger containers (sometimes propane) is also used to achieve intoxication. However, these containers are filled to relatively high pressures and usually need a valve with which to obtain the gas. Domestic fuel (natural) gas is rarely inhaled because it mainly consists of methane, which does not give the desired pharmacological effects.

Inhaling is often a social activity involving groups of young people, and the social context is a significant contributor to the experience of inhaling for many young people. For example, the group may share pseudo hallucinations. Users may pool their money to buy the substances, sharing them with the group. Among some groups of inhalers, bags are kept and particular ones are prized. For example, a group of inhalers in Northampton, England reported:

“you tie the two corners in a knot sometimes and then you'll have a really cool bag. You're the leader but you can get your bag, right. Really enjoy your bag. Like his bag, like when he sniffs they're like
lined with glue, really thick and they feel really good and soft, don’t they? Wicked bags, man, you can swing them about and everything” (unpublished interviews conducted by R. Ives, 1992).

Inhalable products are widely available and are portable so they can be inhaled anywhere at all times. Many users will conceal their inhaling from adults. Some may go to hide-away places to inhale. So-called ‘sniffing dens’ may be constructed and used regularly.

**Reasons for VS use**

Some reasons why young people inhale volatile substances to achieve intoxication are:

- the products are readily available everywhere, and sometimes conveniently packaged and marketed to vulnerable young people;
- they are relatively cheap and easy to buy or steal;
- VS use can be fun, a pleasant activity, especially with group of friends;
- it can be an alternative to alcohol;
- some young people like the excitement of inhaling solvents, perhaps partly because of the element of danger;
- if adults are shocked by inhaling, that can be an attraction;
- for some young people there is the attraction of playing with a new physical sensation. some may do it because their friends are trying it;
- VS use may become a symbolic activity that marks out users as in opposition to the established social order (as happened among some ‘punks’ in Britain in the 1980s);
- hallucinations, even if unpleasant and frightening, can be enjoyable, allowing young people to ‘escape’ - if only temporarily and only in their imagination - from the world of adolescent difficulties and conflicts;
- the intoxication provides an escape from the real world of poverty, deprivation;
- they provide some dulling of the pain of abuse;
- they can help users to forget hunger;
- they give an artificial sense of warmth, which can be very important for street children sleeping outside;
- some users will be dependent on these substances.

**Connection with other substance use**

VS use has similarities to other forms of substance use, like ethanol (alcohol) use. Organic solvents and other volatile compounds can produce dose-related central nervous system effects similar to other hypnosedatives (sleeping pills). Small doses can rapidly lead to euphoria and other disturbances of behaviour which are similarly caused by ethanol, and may also induce delusions and hallucinations. Higher doses may produce life-threatening effects such as convulsions and coma.

Many users of VS are also users of other psychoactive substances, legal and illegal. Using different psychoactive substances in combination may potentiate their effects, and lead to more extreme forms of intoxication with particular health risks attached. Polysubstance use makes it even more difficult to assess the health risks of individual substances.

Since VS are so readily available, they are often the first substances used by young people, along with alcohol and tobacco. They may therefore provide an introduction to intoxication. However, VS use does not inevitably lead to the use of other psychoactive substances and those that develop problematic use have other difficulties in their lives, as a small study has shown.

**Historical context of VS use**

Inhaling substances to achieve intoxication is not a new phenomenon. Actually, it is one of the oldest and simplest forms of intoxication. In ancient times, tribes were known to burn incense and spices to produce mild
intoxicating effects during religious rituals. Snuff (composed of powdered tobacco) can be inhaled. Ether, nitrous oxide ‘laughing gas’ and other volatile products have a history of being inhaled to achieve intoxication.

But the inhaling of commercially available products also has a considerable pedigree. Experimental inhaling of many different substances has a long history; in any group of people, of whatever age, there will generally be one or two at least who inhaled something when they were young, whether it was boot-polish in the army, an industrial chemical at work, or a domestic product in the home, or, as described in a medical publication of 1931:

“Some children and adults who habitually inhale petrol vapour for their pleasure have been the object of various investigations. A girl suffered from disagreeable disturbances of sight due to central scotomy. According to the report of her mother, who cleaned gloves for a living, she had, for some years the habit of sniffing at a rag soaked in Benzine or of holding the petrol bottle to her nose. Especially before bedtime the craving was so violent that neither punishment nor entreaty was of any avail, and although the mother attempted to lock up her store of Benzine, the patient had her own supply which she always replenished from a hiding place in the garden. The girl bought more of the liquid as soon as she had collected a few pence. She was removed from home and placed in a convent. According to the evidence of the nuns, she was not able to indulge in her old habit, although during the first few days she did everything she could to obtain petrol. After three months the relative scotomy, the red and green, had completely disappeared, but normal sight which had been disturbed, was not reestablished”.

In the USA, there was much publicity about glue sniffing in the 1950s and 1960s. The first case in the UK was reported in 1962 but it was only in the 1970s that public concern about inhaling became visible. In the early 1980s this reached a crescendo, and in 1983 the UK Institute for the Study of Drug Dependence received more press cuttings on the subject than on all other drugs put together. Since then, UK public interest in the issue has declined, although the number of deaths did not start to decrease until 1991, and the prevalence of experimental VSU has remained relatively constant, or even increased. In a worldwide scale, many developing countries and developed countries with overcrowded cities also began to report a high prevalence of solvent use among street children.

Prevalence of VS use

The lack of clarity as to what constitutes an inhalant leads to measurement problems in the assessment of incidence and prevalence rates. These problems also arise from poor conceptualization of the questions included on surveys and from subsequent confusion on the part of respondents. Therefore, the state of knowledge regarding the epidemiology of volatile solvent use lags behind that of other drugs. What follows needs to take these caveats into consideration. Data are inadequate and there needs to be regular national studies of drug and VS use that have a consistent methodology. As a UK Home Office report argued:

“Without adequate data on the prevalence and trends in school-age drug misuse, the development of an effective prevention strategy will be fundamentally handicapped. It will be impossible to know whether the situation is improving or deteriorating, either generally or in relation to particular age groups, geographical regions or the use of particular drugs, and it will not be possible to set objective targets. Regular national surveys should be carried out covering data such as the age of onset, once, ever or regular/frequent drug misuse, attitudes to and exposure to drugs” (Davies et al., 1985).

More research is needed on VS use among special groups, such as street children, and among minority ethnic and cultural groups, and indigenous peoples. As well as enabling an estimation of the extent of VS use, international surveys (if repeated at regular intervals) also give an opportunity to compare the effects of different prevention and treatment strategies operating in different countries as well as the extent of experimental use as compared to harmful and dependent use of these substances in various settings. Long-term surveillance is also needed to detect and monitor trends and patterns of volatile solvent use, cross national and cross-cultural studies, using comparable methodologies, would be useful in detecting conditions leading to the use/non use of these
substances and longitudinal studies are needed to address the consequences of long-term use of volatile solvents on the individual’s health.

**Studies in the UK**

In the UK, there have been a number of prevalence surveys, which were reviewed by Ives (1990). The following table (Table 3) is adapted from Ives’ publication. What do these VS use surveys show? Firstly,

<table>
<thead>
<tr>
<th>Reference</th>
<th>Date</th>
<th>Area</th>
<th>Organization</th>
<th>Sample Size</th>
<th>Age Range</th>
<th>% Inhaling</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ramsey A.W</td>
<td>Sept. 1976</td>
<td>Glasgow</td>
<td>-</td>
<td>898 Males in one School m:484, f:552</td>
<td>11-16</td>
<td>Male: 9.8%</td>
</tr>
<tr>
<td>1982</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plant, M. <em>et al</em></td>
<td>1979/80</td>
<td>Lothian</td>
<td>Edinburgh Univ.</td>
<td>m:437, f:520</td>
<td>18-19</td>
<td>m:2.3%, f:1.6%</td>
</tr>
<tr>
<td>1985</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plant, M. <em>et al</em></td>
<td>1983</td>
<td>(follow-up)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1985</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Faber, P. 1985</td>
<td>March 1983</td>
<td>E. Sussex</td>
<td>E. Sussex D.H.A.</td>
<td>7343</td>
<td>11-16</td>
<td>8%</td>
</tr>
<tr>
<td>Lynch, P. 1984</td>
<td>1983</td>
<td>Berkshire</td>
<td>Berks. H.A.</td>
<td>2535 in 7</td>
<td>11-17</td>
<td>8.3%</td>
</tr>
<tr>
<td>Stuart, P. 1986</td>
<td>1985</td>
<td>Macclesfield</td>
<td>Maccs. H.A.</td>
<td>1725 in 2</td>
<td>11-18</td>
<td>6%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>LEAS,</td>
<td>294 YTS</td>
<td>14-16</td>
<td>over 8.2%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>807 in 6 schools</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pritchard, C. <em>et al</em> 1986</td>
<td>Early 1985</td>
<td>B'memouth &amp; S'thampton</td>
<td>Southampton Univ.</td>
<td>3073 in 6 schools</td>
<td>11-16</td>
<td>11%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Swadi, H. 1988</td>
<td>1986</td>
<td>Inner London</td>
<td>Westminster Children's Hospital Pontefract H.A.</td>
<td>1882 in 10 schools</td>
<td>+14-15</td>
<td>1.5%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>New Society</td>
<td>2417</td>
<td>&lt;14-19+</td>
<td>Asian 5%; W.Indian 2%; White 6%; Other 4%</td>
</tr>
<tr>
<td>Williams, M. 1986</td>
<td>1985</td>
<td>England &amp; Wales</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Farrar, M. 1986</td>
<td>1985/6</td>
<td>Calderdale</td>
<td>Solvent &amp; Drug Misuse Standing Group</td>
<td>500</td>
<td>11-18</td>
<td>2-17%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brown <em>et al</em> 1988</td>
<td>1986/7</td>
<td>Portsmouth &amp; Havant</td>
<td>Policy Studies Institute</td>
<td>1063 in 23 schools &amp; F.E. Colleges</td>
<td>11-19</td>
<td>over 4%; over 7% of 11-year-olds</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Balding, J. 1988</td>
<td>1988</td>
<td>Britain</td>
<td>Exeter University</td>
<td>28413</td>
<td>11-16</td>
<td>m:1.7%; f: 2.1%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>m: 2%; f: 2%; m: 6%; f: 6%</td>
</tr>
<tr>
<td>Balding, J. 1996</td>
<td>1995</td>
<td>Britain</td>
<td>Exeter University</td>
<td>16711</td>
<td>13-14</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>15-16</td>
<td></td>
</tr>
</tbody>
</table>

*most young people, in the UK at least, know of VS use - one survey found that 97% of young people were aware of glue sniffing (UK Department of Education and Science, 1983). However, only a small proportion of young people have actually tried VS. Perhaps around 10 per cent of teenagers in the UK although one recent study has reported a figure twice as large (Miller & Plant, 1996). There were no large socioeconomic differences in experimentation in the UK, although there are some regional differences.*

In most studies, boys were a little more likely to have tried volatile substances than girls, although in some the proportions were reversed, with girls experimenting more than boys. There is a discrepancy here between the findings from UK prevalence studies and from VS use-related mortality data. Nearly all the recorded VS use-related deaths (88 per cent) are males, a very different sex balance for which there is as yet no satisfactory explanation. (Taylor et al., 1993).
In most studies, boys were a little more likely to have tried volatile substances than girls, although in some the proportions were reversed, with girls experimenting more than boys. There is a discrepancy here between the findings from UK prevalence studies and from US use-related mortality data. Nearly all the recorded US use-related deaths (88 per cent) are males, a very different sex balance for which there is as yet no satisfactory explanation. (Taylor et al., 1993).

Prevalence in the rest of Europe

Elsewhere in Western Europe the prevalence of VS use is similar to that in the UK. For example, a 1990 survey of 15-year-old adolescents in Denmark reported a 5 per cent prevalence rate of VS use. Kringholm gives an account of 20 deaths occurring between 1959 and 1978 in Denmark: most were male, with ether and trichloroethylene the predominant toxic substances (Kringholm, 1980). In The Netherlands, a large nationwide survey of 10- to 17-year-old adolescents reported a lifetime VS use prevalence of 3.6 per cent for boys and 2.4 per cent for girls (Council of Europe, 1994). In Oslo, Norway, around 10 per cent of 15 to 20 years old had experimented with inhaling (Lavik, 1987). On the other hand, in a study carried out in three secondary schools in the former Yugoslavia found that among 14 to 18 year-old adolescents, 15 per cent of boys and 11 per cent of girls had inhaled (Grubisic-Grebio et al., 1989). In Hungary, by 1990, 55 VS-related deaths had been reported in a ten-year period (Katona, 1995). Detailed epidemiological data is lacking, but Katona reports that ‘inhalant abuse is not the current primary drug abuse problem in Hungary’.

In a consultation meeting with the WHO Substance Abuse Department (WHO/PSA/93.8), Romania reported that the vast majority of its estimated 50 000 street children in 1990 were using volatile solvents.

The WHO Regional Office in Europe has recently compiled information on alcohol, tobacco and other drug-taking in the region. A few countries provided information on the use of volatile solvents. The table below gives the figures reported, which are relatively low as compared with the lifetime prevalence in developing countries from which data is available (Harkin et al., 1997).

<table>
<thead>
<tr>
<th>Country</th>
<th>Year of Survey</th>
<th>Age group</th>
<th>Lifetime Prevalence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Switzerland</td>
<td>1992</td>
<td>20 year-old</td>
<td>8.9%</td>
</tr>
<tr>
<td>Finland</td>
<td>1995</td>
<td>15-year-old</td>
<td>4.6%</td>
</tr>
<tr>
<td>France</td>
<td>1993</td>
<td>11-19 year-old</td>
<td>5%</td>
</tr>
<tr>
<td>Greece</td>
<td>1993</td>
<td>13-18</td>
<td>6.5%</td>
</tr>
<tr>
<td>Spain</td>
<td>1994</td>
<td>14-18</td>
<td>3.1%</td>
</tr>
<tr>
<td>UK</td>
<td>1993</td>
<td>15-16</td>
<td>5.4-6.9%</td>
</tr>
</tbody>
</table>

Prevalence in the USA

In the USA, considerable variation in VS use prevalence is found. The 1990 National Household Survey on Drug Use in the US found that 7 to 8 per cent of 12 to 17-year-olds said they had used volatile substances (Beauvais, 1992). The results of various American studies are reported in review articles by Smart (1986) and Cohen (1979). The two tables taken from Ives, 1990 (Tables 4 & 5), summarize these results. As can be seen, there are considerable variations in the prevalence of solvent inhaling. In particular, isolated Native American communities which have been studied have a very high rate of solvent inhaling, and young people of Hispanic origin also appear to use solvents much more than other youngsters. A NIDA monograph states that there were about 300 deaths in the USA primarily due to inhalant use during 1990, excluding homicides, suicides and other trauma (Sharpe et al., 1992).
### Table 4  Studies quoted by Cohen (1979)

<table>
<thead>
<tr>
<th>Reference</th>
<th>Sample</th>
<th>Ever used solvents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beal 1975</td>
<td>1333 junior &amp; senior high school students in W. Virginia counties</td>
<td>8.0%</td>
</tr>
<tr>
<td>Harrison 1974</td>
<td>7420 grades 7-12 students in a Michigan school district</td>
<td>m: 19.9% f: 15.2%</td>
</tr>
<tr>
<td>Hays 1974</td>
<td>5755 grades 7-12 students in Houston</td>
<td>11.4%</td>
</tr>
<tr>
<td>Maryland Dept. of</td>
<td>1976 22061 grade 10 Maryland students</td>
<td>3.6%</td>
</tr>
<tr>
<td>Health</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lerner &amp; Linder 1975</td>
<td>194 grades 4-6 in a suburban school in the San Francisco area</td>
<td>15.7%</td>
</tr>
<tr>
<td>Geleneau et al 1973</td>
<td>14127 Massachusetts high school students</td>
<td>6.2%</td>
</tr>
<tr>
<td>Hooke 1972</td>
<td>6572 grades 9-12 students in Gary, Indiana</td>
<td>m: 9.1% f: 4.5%</td>
</tr>
<tr>
<td>Yancy et al 1972</td>
<td>7288 grades 10-12 students in Monroe County, N.Y.</td>
<td>7.2%</td>
</tr>
<tr>
<td>Abelson &amp; Fishburne</td>
<td>National survey of three age groups N = 986</td>
<td></td>
</tr>
<tr>
<td>1976</td>
<td>N = 882</td>
<td>Age 12-17, 8.1%</td>
</tr>
<tr>
<td></td>
<td>N = 1708</td>
<td>Age 18-25, 9.0%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Age 26+, 1.9%</td>
</tr>
<tr>
<td>Padilla et al 1970</td>
<td>Mexican-American children</td>
<td>13.1%</td>
</tr>
<tr>
<td>Goldstein 1976</td>
<td>1844 junior and senior Indian high school students</td>
<td>0.172</td>
</tr>
</tbody>
</table>

### Table 5  Studies quoted by Smart (1986)

<table>
<thead>
<tr>
<th>Reference</th>
<th>Area</th>
<th>Sample</th>
<th>Use of solvents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hollender &amp; Davis 1983</td>
<td>Vancouver</td>
<td>-</td>
<td>6.2% used in past 12 months</td>
</tr>
<tr>
<td>Killon 1987</td>
<td>Prince Edward Island</td>
<td>-</td>
<td>3.3%</td>
</tr>
<tr>
<td>Smart et al 1983</td>
<td>Ontario</td>
<td>-</td>
<td>3.2%</td>
</tr>
<tr>
<td>Johnston et al 1983</td>
<td>USA</td>
<td>High school seniors</td>
<td>12.8% (ever used)</td>
</tr>
<tr>
<td>N. Y Substance Abuse Services 1981</td>
<td>3500 people aged 12+</td>
<td>2%</td>
<td></td>
</tr>
<tr>
<td>Angle &amp; Eade 1975</td>
<td>Native communities in N Quebec</td>
<td>6-18 years old</td>
<td>69.4%</td>
</tr>
<tr>
<td>Lynn 1973</td>
<td>Native American N. W. Ontario</td>
<td>49 adults &amp; children</td>
<td>63%</td>
</tr>
<tr>
<td>Kaufman 1973</td>
<td>Indians in New Mexico</td>
<td>72 elementary school children</td>
<td>62%</td>
</tr>
<tr>
<td>May 1982 (review)</td>
<td>Native Americans</td>
<td>-</td>
<td>4-62%. Average 22%</td>
</tr>
<tr>
<td>Richards 1980</td>
<td>Hispanics in US</td>
<td>12-19 years</td>
<td>13-22%</td>
</tr>
</tbody>
</table>
Prevalence in South and Central America

VS use is a particular problem in many South American countries. In Sao Paulo, Brazil, for example, nearly 24 per cent of 9- to 18-year-olds (N=1836) from low socioeconomic backgrounds had tried volatile substances, and 4.9 per cent had ‘inhaled’ within the previous month (Carlini-Cotrim & Carlini, 1988). The use of these substances was associated with poor academic performance; being employed; and heavy alcohol consumption among close relatives. In this study, the substances most commonly used were ‘lança-perfume’ (a mixture of chloroform and diethyl ether) (36%), acetone (34%), petrol (32%), fingernail polish (31%) and glue (25%). Carlini-Cotrim reports that volatile solvents are the most frequently used psychoactive substances, with the exception of alcohol and tobacco, among Brazilian students. ‘Lança-perfume’ and ‘lóló’ are clandestinely manufactured and sold illegally exclusively for the purpose of inhalation. Shoe glue, petrol, fingernail polish and acetone are also used. Although boys reported higher consumption rates than girls, girls seemed to have a preference for inhaling beauty products. VS use becomes more intense in the pre-adolescent phase and usually subsides with age. Early admission to the workforce was found to be associated with VS use. Among street children, rates of VS use varied with their situation: children with family ties, those attending school, and those involved in alternative activities organized by street agencies having lower levels of use (Carlini-Cotrim, 1995).

In Mexico, a national survey of high school students found a lifetime prevalence of VS use of 3.5 per cent, with higher use among males. But among street children in the capital, 27 per cent reported lifetime use with 22 per cent reporting daily use. If a street child used volatile substances, use was generally regular (everyday) and frequent (several times a day). Among this group, factors associated with VS use were: school dropouts, lack of contact with family, early initiation into street work, drugs use among brothers and peers, and migration from rural areas to the city. Children raised in families who used volatile substances in their work were particularly at risk (Medina-Mora & Berenson, 1995). A study in Mexico City and three other urban districts of a representative sample of 2733 people aged 14-above found that 3 per cent of 14- to 24-year-olds were regular inhalant users (‘regular’ is not defined in the report of this study), boys outnumbering girls by four to one. Substances most often used were thinners, plastic cements, bicycles repair cement, show dyes and industrial glues (De la Fuente, 1980). Street children showed strong preferences for certain substances and the more experienced users made their own combinations of substances. In the national school survey, paint thinners and glues were the most commonly used substances (Medina-Mora & Berenson, 1995).

In Bolivia, shoe polish, thinner and petrol are readily available to street children, who make up about a tenth of under 15 years old in Bolivia. The majority seem to have tried VS use, and there are fears about the long-term impact of use on some youngsters (Baldivieso, 1995).

In Colombia, the 1992 National Household Survey found that among 12 to 17 year olds the lifetime prevalence of VS use was 6.6 per cent, with little difference between the two sexes. The average age of starting VS use was 16.8 years, and among ‘ever-users’ who were not current users, the mean duration of use was 6.6 years for males and 5.5 years for females. However, this survey did not include children living on the streets, or those under 12 years old (Duque & Huertas, 1995).

In a cross-national analysis of substance use prevalence in Latin America and the Caribbean, Jutkowitz and Hongsook report findings from a number of studies across the region, which unfortunately are not directly comparable with each other, having been carried out by different researchers at different times using different methodologies. However, despite some reported large differences in lifetime prevalence levels between countries, a general finding is that the prevalence of VS use is highest in the 12- to 14-age groups. VS prevalence data are given for the following countries: Bolivia (1993), Dominican Republic (1992), Ecuador (1989), Guatemala (year of survey: 1990), Haiti (1990), Panama (1991), Paraguay (1991), and Peru (1986 & 1988). Bolivia had the highest lifetime prevalence at around 6 per cent (accurate figures are not given in the paper), while the lowest lifetime prevalence was found by the survey in Ecuador (around 1.2 per cent) (Jutkowitz & Hongsook, 1994).
Overall, inhalants were the fourth most commonly used substance, after alcohol, tobacco and marijuana. In all countries except Haiti, men, more than women, were likely to have tried inhalants but no differences were found with respect to current prevalence. Age at first use for inhalants came considerably earlier than alcohol, tobacco, marijuana and other illicit drugs.

**Prevalence in Australia and New Zealand**

VS use has also been reported in Australia and in New Zealand. In New Zealand, 2 per cent of 14- to 18-years old group studied had tried volatile substances (Casswell, 1992). In Australia, the 1991 National Campaign Against Drug Abuse household survey of 2500 people aged 14-above found that 1 per cent had used volatile substances in the past year (National Drug Information Centre, 1992). A 1983 survey of 4165 secondary students in New South Wales found that about half (46 per cent) reported having experimented with inhaling but only 1 per cent used currently. Between 1974 and 1983, 34 VS-related deaths have been reported. In New Zealand, solvent-related mortality data have been recorded since 1977, and from 1977 to 1992, 47 solvent-inhaling-related deaths were reported. About 80% of these users were male and 74% were below 20 years old (Kin & Navaratnam, 1995).

**Prevalence in Asia**

In an overview of the issue in Asia, Kin and Navaratnam obtained data from nine countries: Brunei Darussalam, Hong Kong, Malaysia, Philippines, Republic of Korea, Singapore and Thailand, also from Australia and New Zealand. In Brunei Darussalam volatile substances commonly used include: toluene and several types of glue, thinner and varnish. In Hong Kong, VS users recorded on the Central Registry of Drug Abuse represented only a small proportion of all cases (0.5 per cent in 1989), and most were males less than 21 years old. In Malaysia, the VS use is seen as a particular problem in East Malaysia, although no national statistics are available. In the Philippines, VS use is seen as a particular problem among street children. Most VS users also use other drugs. In the Republic of Korea, there appears to be no national studies, but butane gases and toluene-containing glue are the most popular substances among VS users. Between 1988 and 1992, a total of 13 504 people was recorded as violating the Harmful Chemical Law. In Singapore, until 1987 there had been 23 cases of deaths associated with glue sniffing - these were the results of accidents or suicide. In Thailand, there was a reported rapid increase of VS use countrywide between 1980 and 1989. In 1988-1999, about 2 per cent of the population who were in drug treatment services were primarily VS users (Kin & Navaratnam, 1995).

There have been reports of VS use in Japan since 1960. Initially VS use was open, but in response to efforts by the authorities to eradicate the problem, their use has become more secretive (Suwaki, 1995). Amongst 12 to 15 year-olds in Japan, 1.5 per cent had tried VSU (2.1 per cent of boys and 0.9 per cent of girls). This survey of 5240 students 12 - 15 years old found that 1.5 per cent had inhaled, and that drinking alcohol and smoking cigarettes had a strong relationship with inhaling VS. School life and family life was significantly less relaxed for lifetime users than for nonusers. ‘Solvent abusers have four characteristic features. First, most of the abusers are in their teens. Second, the abuse is more prevalent among males than females. Third, most abusers come from low-income families. Fourth, most abusers have experience with delinquency’ (Wada & Fukui, 1993). In another paper, the same authors found that the relationship between the parents and the cohesiveness of the family had a strong influence on juvenile solvent use (Wada & Fukui, 1994).

A questionnaire survey of over 8000 secondary school children in Kuala Lumpur, Malaysia, aged between 11 and 20 years (10 per cent of the secondary school population) found that only 1.1 per cent admitted to trying sniffing. Although a small percentage, sniffing volatile products was the most common form of substance use (only 0.3 per cent reported trying cannabis) (Hanjeet et al., 1997).
Prevalence in Africa

Little data are available, but a paper by Obot reports that in Nigeria:

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 forces are young adults and adolescents.

... Because these substances are inexpensive or can be obtained free from home, the potential for their widespread use is high (Obot, 1995).

In a survey of secondary school children in four southern Nigerian cities, lifetime prevalence varied from 2.7 per cent to 35.7 per cent (this highest figure was found among children in Lagos). A study of pupils (average age 16 years) in four schools in the town of Jos (Nigeria) found lifetime prevalence of 25.7 per cent and use in the past month of 11.2 per cent. More boys than girls reported use. Products used included petrol, glue and sprays. In a study of 627 university students, lifetime prevalence was 3.7 per cent.

In Zambia, Obot reports that 13 per cent of male students and 5 per cent of female students in technical and secondary schools had tried VS (Obot, 1995).

A relatively large and carefully conducted study in Zimbabwe of 2783 students in five schools reported levels of VS use that the authors found ‘surprisingly high’ (Eide & Acuda, 1995). After alcohol and tobacco, VS was the most likely drug to have been tried, with 13.9 per cent of boys and 8.4 per cent of girls having tried them. Pupils in private schools were more likely to have tried VS, and there was a statistically significant association between cannabis and VS use among pupils in public schools in urban areas.

Asuni and Pela, writing in 1986 about substance use in Africa, reported an increase in the use of benzene in Sudan, and sniffing of glue and petrol in Ethiopia, Kenya, Nigeria, Somalia, Swaziland and Zambia (Asuni & Pela, 1986). Eide and Acuda, in two studies of substance use among 4761 secondary school children in Zimbabwe in 1990 and 1994, found that around 11.5 per cent of their sample had tried inhalants, and that the sex differences in use were smaller than for other substances. Inhalant use was highest among private school students. Students in rural areas had lower levels of use of psychoactive substances than their urban counterparts, but their use of inhalants tended to be relatively high (Eide & Acuda, 1996).

Du Toit found that: ‘the use of inhalants was much more common among South African school children than the use of ‘hard drugs’. Tetrachloride, cleaning fluids, benzene and mentholated spirits could be found in most kitchens Du Toit, 1991). The study focuses on the period 1974 to 1985, during which time his survey evidence shows that the proportion of black high school seniors in Durban who said they had used volatile substances declined from about 17 per cent to only 2 per cent. Among coloured students it remained fairly constant at around 13 per cent. Indian students had slightly lower rates - around 10 or 11 per cent in the two time periods, while among white school students whereas in 1974 the proportion who had tried volatile substances was 11 per cent, by 1985 this had increased to 23.5 per cent. The author put the changes down to rapid changes in South African political and social culture (Du Toit, 1991).

Prevalence among particular groups

There is concern about the use of VS by certain groups of young people. The WHO Substance Abuse Department identified VS use as a particular problem of ‘street children’, and recommended that prevention and interventions were urgently needed to deal with the almost universal use of organic inhalants among street children in developing countries (WHO, 1993a). However, in a report by the Council of Europe the problem of
substance use among street children across Europe was not seen as a major issue (Steering Committee on Social Policy, 1994).

VS use is thought to have higher-than-average prevalence among children of minority and marginalized groups in Eastern Europe (Council of Europe, 1994). VS use by minority ethnic groups is also a concern. In the US some Native American communities have a very high rate of VS use, and young people of Hispanic origin and Mexican-Americans in the US also appear to be much more likely to use VS than other youngsters (Mata & Rodriguez, 1988). This is also the case in Australia, where many young people of native Australian origin use VS (Brady, 1992; Homel, 1984). Native New Zealanders and Canadian First Nations may also be more vulnerable to VS use (Casswell, 1992). Native American adolescents report higher rates and more frequent use of psychoactive substances, including VS. For example, in a study by Gfellner, among his 'White' group 1.7 per cent reported using solvents and 1.7 per cent glue. Among the 'Indian' group the figures were 9.4 per cent and 4.4 per cent respectively (Gfellner, 1994).

The reasons why such groups are more at risk are unclear, but possible explanations included availability of a variety of products, including gasoline, loss of cultural and indigenous values, poverty, marginalization and limited access to health care and resources.

In the UK it appears that the prevalence of VS use among African-Caribbean and Asian groups may be lower than among their Caucasian counterparts. One survey found that while 2 per cent of Caucasian young people and 3 per cent of Asians had experimented with VS, only 1 per cent of African-Caribbeans had done so (Rudyat et al., 1992).

Although inhaling has been associated with inner-city deprivation in the UK, the connection is not well established and the results of surveys are contradictory. Probably a larger proportion of children 'looked after' by local authorities because of family breakdown try VS use and they are more likely than others to die of VS use-related deaths (Esmail et al., 1993).

Age of experimentation

The peak age for experimentation with volatile substances in Western countries seems to be among 13 to 15 year-old adolescents. However, younger children do experiment as the products are readily available at home, are cheap to buy, they may be curious to try something unknown to them, and peer influences may precipitate first experimentation. Children in especially vulnerable situations may start as early as five to six years of age.

Use by other groups

While adolescent VS users are major cause for concern, VS use does occur among some adults as well. Those who take up the habit in adolescence and carries on inhaling into adulthood are likely to have multiple and difficult-to-deal-with problems. There are also adults who use volatile substances encountered in the workplace.

Health Effects

Acute intoxication

Volatile substances affect human cell membranes in a similar way to alcohol or anaesthetic gases. Being inhaled, they reach the brain very quickly, thus giving a swift intoxication. The many inhalable substances used to achieve intoxication contain different chemicals with different effects on the human body. Characteristics of the product are important and may affect toxicity. For example, it is difficult to control the dose when using butane gas, because of its fast action (compared to toluene in glues). The common practice of spraying it direct into the mouth (whereas substances containing toluene are often inhaled from a bag) also makes dose control difficult. Individual reactions to drugs are very varied; some people are more vulnerable than others to certain substances,
and these different effects cannot be easily predicted. It is therefore difficult to assess the health risks to VS users, but only a very small proportion of VS users suffer lasting ill effects.

Identification of VS use (VSU) from external signs can be difficult. The smell of solvent on the breath is related to the dose and duration of exposure and may last for many hours, however, this will not be present after the use of all substances. The so-called ‘glue-sniffer’s rash’ (perioral eczema) is caused by repeated contact with glue poured into a plastic bag. Nevertheless, in one study only two out of 300 children who regularly used glue were found to have it. VS use may be occurring among children and adolescents who exhibit ‘drunken’ behaviour, unexplained hearing loss, anorexia and mood swings, but many so-called ‘signs and symptoms’ claimed to be associated with VSU are simply the usual behaviours of adolescence.

Acute effects include euphoria, disinhibition, visual or auditory hallucinations, blurred vision, tinnitus, dysarthria, ataxia, agitation, limb and trunk incoordination, tremors, unsteady gait, hyperreflexia, confusion, muscle weakness, headache, abdominal cramps, chest pain, irritability, belligerence, impaired judgement and dizziness. Users may also experience dangerous delusions such as feeling able to fly or swim. Nausea and vomiting with the risk of aspiration can occur at any stage. Flushing, coughing, sneezing and increased salivation are further characteristic features. Stupor, coma, depressed respiration and even convulsions may ensue in severe cases (Flanagan and Ives, 1994).

Other effects of VSU may include recurrent epistaxis (nose bleed), halitosis, oral and nasal ulceration, conjunctivitis, chronic rhinitis, bloodshot eyes, and increased bronchial expectoration. Anorexia, thirst, weight loss and fatigue may also occur. Loss of concentration, depression, lethargy, irritability, hostility and paranoia are further reported complications (Flanagan and Ives, 1994).

Major risks related to acute intoxication

- a sensitization effect on the heart, so that if VS use is followed by exertion or fright, death may result through cardiac arrhythmia
- spraying substances directly into the mouth may cool the throat tissues, causing swelling and perhaps suffocation
- since many of these products are inflammable there is a fire risk, especially when youngsters combine inhaling and smoking
- combining VS use with the use of other substances, especially alcohol, may add to the dangers
- those who use plastic bags to inhale may suffocate themselves. This is a particular danger when large plastic bags are used

Intoxication itself always has potential dangers: people may become more reckless than usual and be less able to deal with danger. Young and inexperienced users run greater risks because intoxication is a new experience for them and some users may do bizarre and possibly dangerous things in response to their hallucinations. If VS users become unconscious, they may choke on their own vomit. Some users inhale on their own in isolated places. These places (including railway embankments, near canals and in derelict buildings) may present special hazards, and help may be far away and difficult to access.

Chronic Effects

Peripheral neuropathy, cerebellar dysfunction, chronic encephalopathy and dementia have been described after chronic VSU (Flanagan and Ives, 1994). Chronic inhalations of toluene-containing products, and of 1,1,1-trichloroethane and trichloroethylene, have been associated with permanent organ damage, especially to the kidney (distal renal acidosis), liver, bone marrow and heart. Lead poisoning from alkyl leads used as ‘antiknock’ agents have been reported as a complication of petrol inhalation. However, since virtually all reports of chronic toxicity after VSU feature case studies or small series of patients referred for treatment, the true incidence of morbidity from VSU is not known.
Long-term effects are difficult to research and little are known about them, but some indications are as follows:

- most inhalable products are mixtures of chemicals and there are few requirements to list the chemicals involved in the package. Additionally, the manufacturers may change the product formulation without notification, thus, making the dangers unpredictable;

- some inhalable products contain poisonous substances such as lead in some petrol or n-hexane in some glues; and

- some people are more vulnerable (genetically or otherwise) than others to certain harmful effects.

Volatile substance-related deaths

The main risk associated with VSU is sudden death. Bass (1970) reported 110 such deaths in the US associated with the use of aerosol propellants and chlorinated solvents during the 1960s. There were at least 114 VS-related deaths in the USA in 1974 (Planagan and Ives, 1994). Fatalities have been recorded, for example, in the USA, Scandinavia and in Japan (Ron 1986). In the UK, where for many years a long-running study has identified VS-related deaths, there is a reported increase of such death from at least two in 1971 to 151 in 1990.

There are no published data on VS-related deaths from other countries comparable to those available in the UK, although individual cases are reported. VS-related mortality statistics provide a crude measure of the problem posed by VS in a particular country and thus can help in assessing the effectiveness of prevention programmes. However, it is not straightforward, as there are many possible circumstances concurrent with VSU that may lead to death, and the causal link to VS use is not always clear. VS-related deaths can easily be overlooked if sudden deaths in children and adolescents are not investigated thoroughly. Postmortem examination usually reveals little, except perhaps acute lung congestion and possibly cold-induced burns to the mouth and throat. A further complication is that friends or parents may remove circumstantial evidence (such as the product used or a plastic bag) from the scene prior to an investigation.

Recently, there has been a decline in the number of UK deaths (from a peak of 151 in 1990, to 57 in 1994, the latest year for which data are available). Since there has been no apparent decline in the level of experimental VS-use in the UK in the period, this decrease is difficult to explain. VS-related deaths occur in all social classes in the UK and in all parts of the country. The age at death has ranged from 9 to 76 years, but most deaths (71%) have occurred among adolescents aged less than 20 years. Most of those who died (88%) were males.

The compounds associated with VS-related deaths in the UK between 1971 and 1994 are: fuel gases - mainly LPG from cigarettes lighter refills (37 per cent of cases); aerosol propellants - fluorocarbons and/or LPG (20%); and solvents from adhesives (19%). Other deaths are linked with a range of other inhalable chemicals, notably 1,1,1-trichloroethane. As data is not available from other countries, this information should not be generalized and may well be different from country to country, depending on the types and availability of specific solvents.

The ways that VS users die are seldom clear. However, indirect effects (such as trauma, aspiration of vomit and asphyxia associated with the use of a plastic bag) are common among the deaths associated with solvents from adhesives, while 'direct toxic effects' predominated in deaths associated with fuel gases, aerosols, and chlorinated (and other) solvents. There are four modes of 'direct' acute VS-related death: anoxia; vagal stimulations leading to bradycardia and cardiac arrest; respiratory depression; and cardiac dysrhythmias. Of these, cardiac dysrhythmia leading to cardiac or cardiorespiratory arrest probably causes most deaths. Sudden alarm, exercise or sexual activity may precipitate an arrhythmia because VS use may sensitise the heart to circulating
catecholamines; in many VS-related deaths the immediate antemortem event is fright and running (Kawakami T et al. 1990).

**Cognitive impairments**

How far are studies from chronic occupational exposure to solvents applicable to those who use volatile substances voluntarily? Dr Ron in a review article looking at the possibility of cognitive impairments from VS use concluded that: "In the light of present knowledge, the possibility that permanent structural brain damage, with accompanying psychiatric manifestations, results from solvent abuse remains inconclusive." (Ron 1986). However, the author was critical of many of the studies done, particularly, their poor matching of control samples and inability to distinguish between acute and chronic effects and inadequate follow-up studies performed. Acute effects apart from death are quickly reversible and likely to be due to transient rather than permanent brain changes. Ron therefore felt that these abnormalities should not be called 'encephalopathy'. Persistent effects include the following:

- cerebellar syndrome (often transient, but sometimes persistent);
- peripheral neuropathy (which is well documented in subjects who have used carbon disulphide, MBK, and n-hexane but toluene's role in the production of neuropathy is not clear);
- radiological abnormalities similar to those described in chronic alcoholics (widening of the cerebellar and cerebral sulci and basal cisterns);
- neuropsychological deficits (see next paragraph); and
- psychiatric disability (there are reports of depression in VS users, but these may not be due to the VS use *per se*).

A large and carefully controlled study of London school children by Chadwick and colleagues (1991) compared some 12 to 16 year old London VS users with their classmates on 35 tests, including intelligence, memory, and examination results. They found that the VS users performed more poorly on four measures: their school examination results; their scores on both verbal and full IQ; and their higher 'impulsivity' (this meant that, when asked not to respond to a stimulus, they found it harder than others not to react). However, after the differences between them and the non-VS users were taken into account in the statistical analysis, the four deficits were no longer statistically significant. This suggests that these deficits were due to the background of the VS users compared with their classmates, and were not due to their VS use. Thus, among this group, VS use did not seem to have a measurable effect on intellectual performance. However, the VS users in this study were experimental and occasional snuffers, so this research does not show whether or not very heavy sniffing can lead to neurological problems.

Ron concluded:

"It thus remains doubtful whether volatile substances and in particular toluene can cause persistent neurological, radiological, or intellectual impairment in a sizeable proportion of subjects in the age group, commonly involved in the practice. There is, however, some evidence to suggest that these abnormalities can be detected in some severe, chronic abusers over the age of 20." (Ron, 1986)

**Embryonic exposure to volatile substances**

Wilkin-Hagh and Gabow found that VS use during pregnancy was associated with increased maternal and foetal morbidity. They state that:

"Toluene-induced renal tubular acidosis occurred in over half of these women and was clustered among long duration abusers.... Among 21 new-borns exposed to toluene in utero pre-term delivery, perinatal death, and growth retardation were significantly increased. Delivery during uncorrected
maternal acidosis further compromised these infants. As children, growth retardation and developmental delay were common findings”.

The author suggests that: “recognition of the unique obstetric and medical characteristics of toluene abuse in women is needed if complications are to be averted and perinatal outcomes improved”.

Hersh (1989) gives two case reports of babies born to mothers who used volatile substances. The first, a Caucasian female, was born at 35 weeks gestation to a 22 year-old woman who had a seven-year history of regular inhalation of pure toluene, paint reducer and spray paint; in adolescence other substance use was reported. During pregnancy she frequently inhaled toluene paint reducer but no alcohol or other substances were used. The second patient was born at term to a 28 year-old primigravida who had at least a ten-year regular history of inhalation of toluene that resulted in mild ataxia, tremor, and slurred speech. During a pregnancy toluene paint reducer was sniffed almost daily. She occasionally consumed alcohol, but did not have any other substance use. The babies experienced microcephaly, attention deficits and/or hyperactivity, developmental delay and growth retardation.

A paper by Donald et al. (1991) reviews a number of case reports describing neonatal effects attributed to toluene inhalation during pregnancy. They pointed out that the foetotoxic effects of toluene have been demonstrated in controlled studies in animals, showing developmental retardation and some evidence in rodents of skeletal and kidney abnormalities. Among women exposed to toluene in an industrial setting, kidney/urinary, gastrointestinal, and cardiac anomalies were found. Among deliberate VS users, there were intrauterine growth retardation, premature deliveries, and retarded physical and cognitive development.

Some writers have suggested that there is a ‘foetal inhalant abuse syndrome’, comparable to ‘foetal alcohol syndrome’. But the data do not support the existence of a delineated syndrome, rather, in the offspring of some mothers who have been exposed to high levels of certain chemicals, either through industrial exposure or through deliberate inhalation, there is a collection of various symptoms. Some of these may be connected with inhaled chemicals, but they may be related to the impoverished diet or to other deleterious living conditions that some chronic VS users experience. Partly for these reasons, even the significance of foetal alcohol syndrome has been questioned in the past (Plant 1987). The data about the role of inhalable chemicals in foetal damage should not be over-interpreted, for the complexities of the chemicals involved - and the complexities of people’s lives - make identification of particular causes of foetal damage difficult.

Paternal exposure to volatile substances may also have a deleterious effect on offspring. An Editorial in the British Medical Journal points out that ‘fathers employed in occupations associated with solvent exposures are more likely to have offspring with anencephaly, with painters having the highest risk’ (Robaire and Hales, 1993).

**Gaps in the research and the potential for international collaboration**

Clearly, more research is needed on this area, but it is long-term and expensive to conduct. It is, therefore, a good example of the need for coordinated international effort. Detailed and relevant survey information is crucial as a basis for further research. Fundamental questions such as the kind and extent of substances used, how far they are combined with other substances and the methods of use are still largely unanswered. All these are essential for planning and evaluating interventions. For example, the UK Advisory Council on the Misuse of Drugs suggested that drug education would be ‘fundamentally handicapped’:

“Without adequate data on the prevalence and trends in school-age drug misuse.... It will be impossible to know whether the situation is improving or deteriorating, either generally or in relation to specific drugs, and it will not be possible to set objective targets. Regular national surveys should be carried out covering data such as the age of onset, once-ever or regular/frequent drug misuse, attitudes to and exposure to drugs. This would enable national targets to be set... Samples should be big enough to allow regional breakdown and breakdown by age and sex. More detailed local
studies would enhance this picture and inform local planning and provision of services” (ACAD, 1993)

Street children in developing countries are more difficult to reach but they may be among the highest risk groups for chronic solvent use problems, along with indigenous peoples, and other marginalized groups. Research should therefore include these high risk groups, as well as school children and adolescents in better conditions. To achieve all this is expensive and needs coordination nationally and internationally. For example, a European school survey of young people’s drug use included questions about volatile substances in some, but not in all, of the participating countries. Interesting differences between countries may help to inform practice.

With this baseline research in place, more investigation is needed into the health risks of volatile substance use. This will require long-term studies to enable VS users to be followed over a number of years so that any developing health problems can be identified. It will require studies involving large numbers of subjects so that some of the relatively rare health problems can be adequately studied. And it will require careful monitoring of the substances used, taking account of changes on their formulation. For this, cooperation with manufacturers and distributors of these products will be required. Studies of the effects on health will need to take account of other relevant factors in the lives of VS users, in particular, poverty, nutritional problems and other deprivations that may have deleterious effects on health.

There are many suggestions of the links between physical, emotional and sexual abuse and VS use, and between family problems in childhood and VS use. These should be investigated further. Abuse can lead to low self-esteem. Self-esteem is thought to be a protective factor in helping young people to resist substance use that goes beyond experimentation. The role of low self-esteem as a precipitating factor in chronic VS use should be further investigated.

Where interventions are made, these should be properly evaluated. Here there is scope for international collaborative studies which compare similar interventions in different cultural contexts. International comparison studies can utilise existing differences between countries to identify trends and responses to different legislative control, prevention and treatment regimes as a part of ‘natural experiments’. Multinational VS manufacturers can also become partners in some investigations, providing information on different product formulations in different countries, for example. They may also be a source of funding for some work. The alleged role of some multinationals in supplying products deliberately designed, or distributed, for use to achieve intoxication needs further investigation.

Research is further made difficult by the problems of contacting and maintaining contact with the client group. Use of action research, partly conducted by those working with VS users would help to ensure that representative samples are obtained and that follow-up contact is made easier. In any case, close collaboration between researchers, workers and the communities they serve is essential in gaining cooperation, and is ethically important.

**APPROACHES TO PREVENTION**

There are varieties of prevention strategies that can be employed and each of the following will be considered:

Tackling supply -
- product elimination
- product modification
- labelling
education for retailers  
sales controls  

Tackling demand - 
legal controls  
information and education (for young people, for parents and carers)  

Tackling supply  

Product elimination  

By analogy with the efforts to tackle the problem of illegal substance use, it is often suggested that controlling the supply of potentially inhalable products would reduce the problem of VS use. However, supply-side measures on their own are ineffective in dealing with illegal substance use. Since volatile substances are ubiquitous in modern societies it is not possible to eliminate them all and even if it was possible to eliminate some products there are many others that young people could substitute with. Furthermore, it would arguably be unfair to eliminate products that are legitimately useful in the modern society.  

Nevertheless, it may be that there are some products that are particularly dangerous, and for which there are satisfactory substitutes. There is an example of such a product in the UK. A government committee that examined the problem of VS use was struck by the large proportion of VS use-related deaths that were associated with the use of butane cigarettes lighter refills. They recommended that the manufacturers withdraw from sale the large-size canisters, and restrict the size of refills to about 25 ml (Advisory Council on the Misuse of Drugs, 1995). Since the market for lighter refills was limited and changing as more people were using disposable lighters this change was relatively painless and has largely been made. It is too early to say whether this action has had any effect on use or on deaths.  

In some developing countries there has been much concern about the alleged neglect of the problem by manufacturers of volatile products. For example, Bruce Harris points out that H.B. Fuller, an American manufacturer, sells a shoe glue in Latin America that may not be sold in North America. Considerable profits are at stake: while 15 per cent of H.B. Fuller’s sales are in Latin America, 26 per cent of their profits is derived from this market (Swift, 1995). Harris’ organization has pursued legal action against the company, alleging their responsibility in the death of a Guatemalan street child.  

Product modification  

If products cannot be eliminated then perhaps there are scopes for modification to make them more difficult or impossible to use to achieve intoxication? There are three main ways in which this might be done:  

- modify the product by changing the formulation so that it no longer contains an intoxicating substance;  
- add something to the product to make it unpalatable; and  
- modify the container to make it more difficult to use.  

The changes in the formulation of Tipp-Ex correction fluid is an example of the first. The Tipp-Ex case study is considered in detail in Ives (1995a). With its brand under pressure in English schools, many of which were banning the use of solvent-based correction fluid, one of the responses of Tipp-Ex was to produce a non-abusable, water-based formula, aimed at this market and called School and Study. However, the solvent-based Tipp-Ex Original is still on sale and the water-based product is inferior to it.  

An example of the second is the addition of 'stenching agents': unpleasant smelling chemicals. But many unpleasant-smelling substances are dangerous to health. Furthermore, it would be impossible to add unpleasant
odours to products such as hair sprays, deodorants and air fresheners. A review by NIDA in the USA concluded: ‘After substantial effort, Texas and New York’s 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’ (Sharpe et al., 1992).

The third possibility is more practical. There are several possibilities for mechanical modification of products, including:

- modification of the delivery system of aerosol products to prevent the gaseous propellant being extracted from the container separately from the product;
- the use of non-abusable propellants (such as carbon dioxide) via a modified delivery system; and
- dispensers that only issue a limited amount of the product which is not sufficient to achieve intoxication.

Some of these methods are technically feasible for some, but not for all aerosol products. However, these would make the product more expensive, and in a world of free trade would probably not be able to command a market if cheaper, unmodified products were also on sale. Nevertheless, partly because of environmental concerns, some aerosol products are now available in pump-action containers with no need for a propellant. Also halocarbon fire extinguishers are being replaced by extinguishers containing carbon dioxide.

Labelling

If products have potential for harm, it makes sense to have warning labels on them. There have been worries that labelling products in this way draws attention to their potential use to achieve intoxication, but since most young people usually know about this possibility the chance of reducing harm in this way seems to outweigh this risk. However, it is questionable how effective labels are. It is also unlikely that labelling would be made compulsory. In the UK, a committee, ‘The Industry-led Forum’ (which was set up after a recommendation from the Advisory Council on the Misuse of Drugs 1995 report, Volatile Substance Abuse, and which includes representatives of government and manufacturers) recently commissioned consumer research and deliberated on this matter. They have recommended voluntary labelling with the wording: ‘Solvent abuse can kill instantly’ (The Qualitative Consultancy, 1997).

Information and education for retailers

Given the widespread availability of inhalable products, it is important for those who sell them to have information about their potential for intoxication and harm. In the UK, the government funded the production of point-of-sale stickers with a statement about the sale of solvent-based products. A training video for retailers was also produced explaining their legal requirements (see below). Large retailers such as Woolworth and Sainsburys have produced their own point-of-sale material. Leaflets for retailers are available in English and in a number of minority languages because many small shopkeepers in the UK do not speak English as their first language. British Retail Consortium, a trade association, has prepared a voluntary code of practice on the sale of gas lighter refills preventing their sale to under-16s. As there are many products available through many retail outlets, a young person can get easy access to several inhalable substances, and thus the effectiveness of isolated measures is limited.

Sales controls

Statutory controls on VS use have been implemented in a number of countries. In Japan, the sale or supply of specified substances to juveniles is an offence, and in 1991, 3479 people were arrested for knowingly selling or giving thinners or other solvents to juveniles.
Many other countries have controls on the sale and supply of inhalable products. In Belgium, for example, some products have been withdrawn, and the size and types of available substances have been limited. In France, since 1984 the sale of trichloroethylene to minors has been forbidden. A 1992 Report by the National Institute on Drug Abuse (NIDA) in the United States found that 43 states had passed statutes specifically directed at inhalants; 41 states had criminal statutes regarding use of inhalants, 31 states had business regulations on product formulation or access, 10 states had prevention or treatment related statutes. However:

“there have been no evaluations of these laws, and it would appear that these laws are rarely enforced, if at all….. There is no explicit Federal policy with respect to inhalant abuse. Only a single Act of Congress has been passed, and that Act dealt with only one small class of inhalants (nitrites). The only regulations specifically focused on inhalant abuse were requirements for labelling of pressurized food and cosmetic products” (Sharpe et al., 1992).

The report continues:

“Texas has arguably attempted the most broad ranging efforts against inhalant abuse, including ... an innovative $25 licence 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 printed material about inhalants, and to fund several local prevention campaigns” (Sharpe et al., 1992).

In Australia, most State Governments have adopted some form of controlling legislation, although not always specifically directed at sales. In Queensland, the poisons' regulations were amended in 1983, requiring that glues containing volatile solvents to be placed out of reach. In New South Wales, warning labels are required on specified products. In South Australia, the Controlled Substances Act of 1983 makes the supply of volatile substances for purposes of inhalation a crime, punishable by a fine or two years imprisonment.

The ‘Task Force on Drug Abuse’, which reported to the Government of Western Australia in September 1995, recommended that chronic users should be a priority target of community drug service teams, and that state and local initiatives which included industry codes of practice should aim to restrict the supply of some substances to at-risk youth. They further recommended that ‘the central drug coordinating office should pursue the development and adoption of a formal code of conduct by appropriate retailers, and facilitate local action where appropriate with the aim of limiting the supply of volatile substances to minors’ (Task Force on Drug Abuse, 1995).

The Philippines’ Presidential Decree 1619, promulgated in 1979, imposes criminal sanctions on those who use, possess, or engage in the unauthorized sale of volatile substances to minors. In the Republic of Korea, selling certain chemical substances (including toluene, ethyl acetate and methyl alcohol) for intoxication purposes can be charged under the Harmful Chemical Control law. Thailand has an Act on the Prevention of Inhalant Abuse (VE253, 1990). Under this legislation, the sale of inhalant substances to children under 17 years old is prohibited.

In the UK, there are statutory controls on the sale of inhalable products to young people. The Intoxicating Substances Supply Act, passed in 1985, makes it an offence (in England and Wales) to supply to a young person under 18 a substance which the supplier knows, or has reason to believe, will be used ‘to achieve intoxication’. The maximum penalties for infringement are six months’ imprisonment and/or a £5000 fine. (In Scotland, sales such as these are illegal under common law.) So although the law is mainly directed at shopkeepers, it could also be applied to anyone who sells or gives a young person an inhalable product. No list of products is included. Only a few prosecutions have been brought under this Act: by 1992 there had been 55 prosecutions and 36

* 'chronic use' is undefined, but it is implied that chronic users are those who frequently (daily) use volatile substances (Task Force Report, Volume 2, page 357).
convictions. In many cases the threat of legal action has been enough to stop those few shopkeepers who attempted to profit from glue and solvent sales to volatile substance users.

It has been argued that control of supply is not effective. There are many places where young people can purchase inhalable products. It is not easy for shopkeepers to recognize solvent users, and it is hard for them to know whether a young person will use a product for legitimate purposes or to achieve intoxication. Although most users are aged under 18 years, many are older and are therefore not covered by the UK law on sales: of 1237 VSU-related deaths in the UK between 1971 and 1991 two-fifths were over 18 years old (Taylor et al., 1992). It is also difficult to keep track of all the products that can be used: surveys of retailers in the UK found that less than half were aware that substances other than glue could be used. Thus, even if the legislation has had some effect in controlling the sale of glue (because most adults are aware of glue sniffing), young people who are determined to use volatile products can readily purchase other inhalable products to which retailers are not alerted. These can be more dangerous.

Supply controls can therefore have a paradoxical effect of increasing the risk of harm. An analysis of UK deaths related to volatile substance use that occurred before and after the introduction of sales controls gives cause for concern. Among under 18 year-olds, deaths associated with glues and solvents dropped, but the mortality associated with gaseous inhalants (aerosols and butane gases) continued to rise. It is suggested that: ‘the sustained publicity concerning ‘glue sniffing’ and ‘solvent abuse’ together with restriction of supply has shifted practice towards the riskier practice of ‘gas sniffing’’ (Esmail et al., 1992). It is important to recognize that attempt to control supply should take account of the differences between different kinds of users and the reasons why and how they seek such substances.

Tackling demand

Legal controls

In the UK, it has generally been considered impractical to make VS use a legal offence. It is argued that proscription would make VS users even more secretive and harder to help. However, the police in the UK do have powers to intervene in certain cases. The Public Order Act, 1936 curbed insulting or threatening behaviour, and Section 5 of the Public Order Act, 1986 gave the police powers to deal with ‘harassment, alarm or distress’, where ‘awareness impaired by intoxication’ was not a defence, intoxication being defined as by ‘drink, drugs or other means’. The Road Traffic Act, 1988 enables prosecution of those who drive motor vehicles under the influence of VS. Sometimes, old laws have been used to deal with users, such as the Ecclesiastical Courts Jurisdiction Act of 1860. By-laws controlling behaviour in public parks and intoxication on railway property have also been used. The Children Act, 1989 has implications for the welfare of young people who are ‘sniffing’ and would also apply in some cases where parents of young children used VS.

In Japan, ‘the consumption or inhalation of poisonous or deleterious substances or possession of such substances for the purpose of consumption or inhalation’ is a criminal offence punishable by up to two years imprisonment, or a fine of up to 50,000 yen, or both. In Singapore, the Intoxicating Substances Act of 1987 has made inhalant use an offence. Under the Act, suspected inhalant users 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 the legislation, a three-month anti-glue sniffing and anti-inhalant use campaign was launched in 1988’ (Kin & Navaratnam, 1995). Inhaling is also an offence in the Republic of Korea, where people using glues or thinners for purposes of hallucination and stimulation can be prosecuted.

Information and education

Measures controlling supply are only part of strategies for reducing the harm of substance use, and they are fraught with difficulty and may have unexpected and harmful effects. A better approach is generally seen to be
the provision of information and education. Labelling of products is one way to do this, but more
detailed information can be provided through public advertising, leaflets and booklets, as well as education in schools,
and through health professionals, parents, police officers and other people likely to deal with solvent users.

(a) Information and education for parents and carers

Information needs to be targeted at parents because studies have shown that many parents are not aware of the
potential use of household products other than glue. In 1992 an information campaign by the UK Department
of Health provided parents with basic facts about solvents via a nationally distributed booklet (UK Department
of Health, 1992). Post-campaign research indicated increased parental awareness of VS use, and some evidence
that parents have discussed VS use with their children as a result of the campaign, although these conversations
had generally been short and unsophisticated (Wheeler, 1996). Subsequently, attempts have been made to use
public campaigns to improve the quality of the parents' conversations. An educational campaign early in 1994
stressed how important it was for parents to talk with, and listen to their children. The leaflet for parents, Drugs
and Solvents: You and Your Child, exhorted: ‘If you don't talk to your child about drugs, someone else will’ (UK
Department of Health, 1993).

If a national campaign is not feasible, lectures and group discussions with parents can be organized at the
community level, through the schools, church, public meetings, NGOs, and other types of community-based
organizations.

A free phone National Drugs Helpline, funded by government, has been established in the UK. It is reported
that 2 per cent of its calls concern volatile substances. National voluntary agencies have also been active in
providing information for parents.

The transfer of the drugs and solvents advertising budget from the Department of Health to the Health Education
Authority (HEA) signalled renewed concentration on raising parents' basic awareness of the problem in the UK.
The HEA's 1996 campaign of advertisements in popular consumer magazines had the slogans: 'What killed more
teenagers than heroin in the UK last year?', accompanied by a picture of a syringe transforming into an aerosol,
and 'How harmful could gases, glues and aerosols be to your teenager?', accompanied by a picture of bullets
transforming into aerosols.

One objection to campaigns like these is that the focus on parents is unhelpful. Public education campaigns, it
is argued, should aim to address issues faced by young people and their families in today's complex society. The
programme of the Federal Centre for Health Education (FCHE) in Germany deliberately avoided addressing
parents alone. Instead, its advertising campaign was directed towards all adults in contact with children and
young people, and did not provide information about drugs or solvents, but sought to increase understanding of
young people's motivations for using them. As the FCHE points out: 'Neither shock nor accusation is used in
the advertisement texts or pictures. Rather, they try to show understanding for the fact that the demands placed
on the target groups are tough ones' (Ives, 1995a).

(b) Health professional training: some ideas for a curriculum and strategies for implementation

Training is a crucial need for professionals and volunteers working with young VS users. It is needed both at
initial training and when in-service training is undertaken. While specialist substance use workers often need
specific training in working with VS-using clients, there is a wide range of other professionals, volunteers and
others who need to know more about VS-use and what to do about it. It is necessary, but not sufficient, for all
workers to be able to recognize VS use when it is taking place, and to know what to do in an emergency.

The curricula for these staff and volunteers must be adapted to their needs. In planning a response to VS use at
a local level it is important to assess the local need, and plan training to meet that need. Training should be
carefully evaluated in relation to its intentions and the long-term outcomes monitored.
It is important to be clear about the purpose of training, keeping it focused and having clear objectives that are appropriate to the trainees' needs, and by which it can be evaluated. Training will have elements of developing knowledge, improving skills and altering beliefs and attitudes. Skills such as dealing with a medical emergency are clearly important, but equally important are attitudes to young other substances and VS users, for these will have a powerful influence on a worker's approach to working with this client group. More details are given on the second part of this document. The way the training is organized and who is involved in it will make a big difference to its success. Multi-disciplinary training enables trainees to mix with people they might not normally encounter, and the different perspectives on the issue of people from different backgrounds can provide useful learning opportunities. However, it is important to choose the multi-disciplinary group carefully, to ensure an appropriate mix of people. In particular, it is important not to include people with very disparate levels of work or of knowledge.

Training needs careful preparation. A well-designed application form can provide information about the participants that can be used in planning the event. If applicants are asked to undertake some advance preparation, this can add value to the actual training event. It can also be useful to set tasks for the participants after the training event, or if the event is in several parts (for example a three-day course spread over three weeks), tasks can be set for the trainees to complete between the parts.

This means that training events are only part of the programme. Other elements, for example, of private study and putting into practice what one has learnt, are also important. Study sessions and practice groups can be self-organizing, but may need some help to start up, and support for continuity. Self-study packs and other distance learning techniques can be employed particularly when resources are limited and where distances are great. With the spread of cheaper computers and telecommunication, the use of the Internet may become increasingly important.

Training should be based on what is known about learning, and should utilize a variety of techniques. Many creative ideas for education of young people that can be adapted for adult training are included in WHO's manual for youth and substance use (WHO/HSC/SAB/99.3). It is particularly a useful source of ideas for those who are conducting training for young volunteers and peer educators. Getting the right people to run the training is crucial: the trainer can make a considerable difference to the success of the course.

Training in itself is a skill that should not be underestimated. Better results of training may come from co-training: having an experienced trainer who does not necessarily know all the details of VS use, and working together with someone who is not a trainer but knows about VS use.
Training checklist

Training should be:
- planned and coherent, part of a training strategy, and carried out with wide agreement from the participating agencies in a defined geographical region, with defined aims and an identified target audience;
- offered at a clearly defined level which, at the higher levels, builds on training previously offered at lower levels.
- Perhaps offered as part of a focused training programme - on VS in the context of the use of other substances, on VS in the context of the difficulties of young people, or VS in a more practice-focused context, or combining these in some way;
- either multi-disciplinary with the advantages of having different professional perspectives on the issues and enabling the development of networks, but with the possible disadvantage of sacrificing some depth;
- focused on practice but including material which helps participants to understand the issues surrounding the use of volatile other substances, including the role of young people in society;
- or clearly focused on one or two disciplines or agencies with the advantages of being able to address relevant aspects of the problem in some depth and of dealing more directly with significant aspects of professional practice;
- widely advertised with a great deal of advance notice.
- Insufficient advance notice is often given as a reason for non-attendance at training events. Long lead-times are necessary to ensure that publicity reaches the target audience in time for them to make arrangements for release;
- prepared for thoroughly, which may include advance preparation; for example, reading material sent out to prospective participants,
- put on in congenial surroundings (if it takes the form of a course), conducive to learning and locally accessible;
- experiential rather than didactic, using methods drawn from knowledge of adult learning, and developing the skills and experience of the participants by starting from where they are in their understanding and building on their expertise;
- evaluated promptly but, also followed up after some time to assess whether the training has resulted in changes in work practice.

(taken from Ives, 1991)

Obtaining funding for training is often difficult. It is important to emphasize the outcomes of the training and how the ultimate client group – the young people - will be helped. Services in kind may be easier to obtain; for example, a local business enterprise might provide space for meetings, a printer to duplicate handouts, and some refreshments.

The content of the training should be discussed thoroughly by the trainers, and, if possible, negotiated with the trainees. An example of relevant content for a one-day course for workers with street children is as follows:

- Introductions, exchanging information, sharing experiences (including a discussion of any preparatory work that has been set);
- Identifying reasons for, and exploring attitudes to substance use by street children;
- Providing information on substances used and their effects, short-term and long-term;
- Discussion of different ways of working with substance-using young people (drawing on the experience of the group);
- Practice at developing skills in working, through case studies, role-play, etc.;
- Identification of the broader issues into which the work fits;
- Planning future training and setting of follow-up tasks;
- Providing information about sources of further help and advice;
- Help with handling an emergency: discussion, guidance or practical training (as appropriate to the needs of the group).

(c) Information and education for young people

The UK Department of Health, and more recently the HEA, have also targeted advertising at young people and provided free information booklets. The booklet for teenagers gives nonjudgmental information about various illegal substances, while for preteens, a cartoon story gives the message that it is risky to put powerful chemicals into one’s body.

But it is in schools that the UK has recently invested much effort. A government report on education (ACMD, 1993) presaged a document of guidance from the Department for Education (Department of Education, 1995)
informing schools of the requirements of the National Curriculum (which makes some drug education a part of the compulsory science curriculum) and giving advice on other aspects (including dealing with drug-related incidents in school). This guidance made specific reference to VS. Grants for education and training of teachers in drug and VS education have been distributed. The recent Inspectorate report on drug education found that the quality of drug education was mostly well delivered and that pupils’ knowledge was often good (Ofsted, 1997).

Psychoactive substances and VS education in the UK is generally delivered in the context of the science curriculum and within personal social and health education (PSHE). At its best, it is part of an approach that stresses healthy living, self-esteem and making responsible choices. As the ACMD puts it, ‘drug education is more likely to have an impact when it teaches decision-making and life-skills rather than relying on a didactic approach.’ (ACMD, 1995). It is also integrated with other potentially problematic issues such as healthy eating, bullying and use and road safety. It also incorporates alcohol education and education about smoking tobacco. However, some material focuses specifically on VS (e.g. TACADE, 1997).

Starting early education about volatile substances is essential because these products are in most people’s homes and, therefore, (unlike illegal drugs) very young children have legitimate access to them. Education about VS can therefore be part of first-school education concerned with safer living in a society full of potential dangers.

Thus in the UK as elsewhere, school-based education is seen as the main vehicle for communicating information about drugs and VS. But there are two problems. Firstly, even when drug education is delivered in schools, education about VS use is often forgotten, and as the NIDA monograph puts it:

“General drug abuse prevention efforts tend to ignore inhalants…. Of 16 school-based substance prevention curricula reviewed, only half gave information about inhalants to students. The others either completely omitted inhalants, or only gave inhalant information to teachers…” (Sharpe et al., 1992).

“The National Drug Control Strategy barely mentions inhalants, and contains no policy initiatives or recommendations specific to inhalants…”. The nationwide drug-free schools’ programme has resulted in rapid proliferation of school-based prevention since it was passed in 1986, but the Act does not address inhalants, and many of the curricular use by schools also leave out inhalants.

“The Drug-free Schools and Communities Act (DFSCA) requires each school district receiving federal funding to implement comprehensive substance abuse programmes for grades kindergarten through 12. Virtually all school districts have some kind of programme in place. The (DFSCA) does not specify what should be in the programmes. 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 these programmes” (Sharpe et al., 1992).

The second problem concerns the effectiveness of VS and other substances’ education.

A review of prevention strategies concluded that the international evidence for the effectiveness of drug education was weak and suggested that prevention programmes should include law enforcement, community involvement and information as part of a multi-agency package addressing locally agreed objectives (Dorn & Murji, 1992). Measuring effectiveness is difficult and depends on how it is defined. For most people, it is implicit that young people’s use of these substances will be reduced. But the connection between information and behaviour is not so straightforward, and it is hard to demonstrate the effectiveness of drug education (Ives & Clements, 1996).

A WHO review found that the life skills’ approach had the best chance of success. A WHO report defined ‘Life Skills’ as:

“abilities for adaptive and positive behaviour, that enable individuals to deal effectively with the demands and challenges of everyday life. Life skills, from this perspective, are essentially those abilities
that help to promote mental well being and confidence in young people as they face the realities of life. Secondly, to enable children to learn and practice skills, life skills’ education is based on a child-centred, activity-oriented methodology. Finally, life skills education is based on the philosophy that young people should be encouraged to take more responsibility for their own actions” (Birrel & Orley, 1996).

Life skills’ education is therefore much broader than drug education but includes it. In the UK, the charity, TACADE, takes a life skills’ approach to drug, VS and alcohol education. In Belgium the organization, De Sleutel, produces materials and delivers life-skills-based training to teachers.

What should preventive programmes contain? A WHO publication (Anderson, 1995) gives the following table, showing components of preventive programmes in schools.

<table>
<thead>
<tr>
<th>Component</th>
<th>Aim</th>
<th>Format of Delivery</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information</td>
<td>To target knowledge and beliefs about substances</td>
<td>Lectures, films, discussions, debates, books</td>
</tr>
<tr>
<td>Training on decision</td>
<td>To teach a process for making rational decisions about substance use</td>
<td>Lectures, discussions, worksheets, role play.</td>
</tr>
<tr>
<td>making Pledge</td>
<td>To make a statement of personal commitment not to use substances, often within a moral context</td>
<td>Oral or written statement, wearing of a badge</td>
</tr>
<tr>
<td>Values clarification</td>
<td>To examine personal values related to substances, and to demonstrate the incompatibility of substance use with these values</td>
<td>Group discussions, worksheets</td>
</tr>
<tr>
<td>Training in goal setting</td>
<td>To develop skills in goal setting and encourage their achievement</td>
<td>Didactic instruction, worksheets, out of class projects, self monitoring of class performance</td>
</tr>
<tr>
<td>Training in stress</td>
<td>To teach coping skills, with special emphasis on relaxation techniques</td>
<td>Didactic instruction, discussions, worksheets, practicing of skills</td>
</tr>
<tr>
<td>management Training in self-esteem</td>
<td>To develop feelings of self-worth and value</td>
<td>Work sheets, discussions</td>
</tr>
<tr>
<td>Training in resistance skills</td>
<td>To teach skills for identifying and resisting peer and other influences (from advertising, parents and siblings) to use substances</td>
<td>Films, discussions, role playing, assertiveness training</td>
</tr>
<tr>
<td>Training in life skills</td>
<td>To develop broad social skills and skills in conflict resolution</td>
<td>Lectures, discussions, role play, practicing of skills</td>
</tr>
<tr>
<td>Training in norm setting</td>
<td>To establish norms on substance use by correcting misperceptions of its prevalence in and acceptability to peers</td>
<td>Surveys, games, discussions, debates, use of peer leaders, testimonials</td>
</tr>
<tr>
<td>Peer assistance</td>
<td>Intervention and counseling by students the same age as or older than the target group</td>
<td>Peer-led discussions in the classroom, peer assistance and referral outside the classroom</td>
</tr>
<tr>
<td>Alternatives</td>
<td>To offer creative or physically challenging activities incompatible with substance use and/or an attractive alternative to substance use</td>
<td>-</td>
</tr>
</tbody>
</table>

This is a very useful list, although not all programmes should contain all the elements. The particular advantage of this approach is that individual substances are not the focus of the programmes; rather, these curricula provide generic skills for tackling many of life’s problems.

The WHO Substance Abuse Department has produced a very useful guide for developing educational activities about substance use with young people (WHO/HSC/SAB/99.3). This lively publication has many ideas for activities that can be carried out on a limited budget. It stresses the importance of cultural appropriateness of health education interventions and of participative involvement by the young people concerned. It also contains advice on evaluation.

**Implementation**

It is becoming increasingly apparent that the effectiveness of educational interventions depends very much on how they are implemented in the classroom or elsewhere. It is no longer sufficient to design an educational package and assume that all schools will implement it uniformly. Educational packages must be adaptable and be able to accommodate differences between schools. A report by TACADE on effective implementation of drug education in five European countries presented a model for the implementation of drug education in European secondary schools (TACADE, 1995). It identified eight factors of importance in implementation:

- school climate
• curriculum
• sociopolitical context
• resources
• teachers
• programme characteristics
• students
• the need and priority which the school gave to having such a programme.

All these factors need to be considered when an educational intervention is being evaluated.

Community involvement

The evidence on the effectiveness of school-based education about psychoactive substances and VS is that it has more chances of success when the whole community is involved. In the UK, material from TACADE helps schools to involve school governors and the community in substance use prevention (Evans et al., 1994) and the Drug Prevention Initiative teams are involved in a number of innovative community-based schemes in areas of high drug use (Home Office, 1997).

Furthermore, schools do not reach all young people, and the ones whom it does not reach may be particularly at risk of psychoactive substance use including VS. These will include school refusers and street children. Out-of-school education should therefore be an important component of any prevention strategy, especially in countries where school attendance rates are poor, or where the school leaving age is low.

In many countries, youth services, both voluntary and those run by the state, have an important role to play. In the UK, the recent report by the Office for Standards in Education found many examples of good practice in drug and VS prevention in the statutory and voluntary youth services. However, there was a lack of coordination in some areas and information was not exchanged between projects. Monitoring and evaluation was generally not given sufficient attention (Ofsted, 1996).

Evaluation issues

We have seen that there is limited evidence from the evaluations of public information campaigns in the UK that such campaigns encourage parents to discuss drugs and VS with their children. There is also suggestive data that links a drop in the number of VS use related deaths to under 18 year-olds with the onset of a public education campaign (Taylor et al., 1996).

However, as already discussed, evaluations of school-based drug and VS education have not convincingly demonstrated its effectiveness. A review article of drug education by Ives and Clements concluded that its efficacy was uncertain (Ives & Clements, 1996).

As NIDA puts it:

"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 programmes in general, or on inhalant abuse in specific. ... Demand reduction efforts targeted at inhalants have been rare and when performed they have not been evaluated" (Sharpe et al., 1992).

Using tested programmes of education or other forms of intervention is obviously preferable to using untested ones. However, there can be great variation in the way that programmes are implemented, which may confound
attempts to measure efficacy. Programmes need to be adapted to suit the needs of different cultures, but doing so may mean that in their implementation they could vary differently from which was intended by their producers. The adapted programme may have changed objectives, so that it cannot be evaluated by measuring its achievement in relation to the original objectives. For example, an evaluation of TACADE’s school programme Skills for Adolescents in the UK found that this programme - which had been imported from the USA - was not being implemented in the tightly-focused way that its originators had intended. TACADE’s replacement programme, Skills for Life, emphasizes the importance of the implementation process. This varied a great deal between schools and made it difficult to conduct an evaluation of the programme itself (Ives & Wyvill, 1997).

Evaluations of particular programmes or interventions, therefore, need to be repeated whenever they are introduced into a different culture. These evaluations need to identify implementation issues and take account of any changes in the objectives of the programmes. Only then will it be possible to know whether a particular programme or intervention can be suitably adapted to the culture.

RISK FACTORS AND TARGETED INTERVENTIONS

VS and other psychoactive substance use education are generally aimed at the whole population of young people, but if risk factors for substance use and the use of VS to achieve intoxication can be identified, it might be possible to target interventions more closely on those people most likely to use psychoactive substances. However, these risk factors are not always obvious and researching them is a complicated problem requiring long-term research.

Furthermore, there is a danger of stigmatizing those targeted, and the potential for a self-fulfilling prophecy: ‘you say I am at risk of VS use – well then, I will try it’. Nevertheless, this danger does not exist when targeting most street children who are already stigmatized, and of whom a large proportion are already using VS. Actually, for marginalized groups such as street children or indigenous groups, strategies should begin by changing negative attitudes that the community, including health professionals, have against them.

A VS use prevention strategy needs to consider the connection between VS use and other substance use. VS may be used in combination with illegal substances, with alcohol and tobacco (Dinwiddie et al., 1991). Thirdly, the reasons underlying dependent VS use may be similar to those related to dependence and harmful use of other substances; thus, they may be susceptible to similar treatment approaches. VS use prevention strategies should therefore take account of the potential or actual use of other substances.

Tapia-Conyer et al. (1995) looked at risk factors for inhalant use among juvenile offenders in Mexico. Among a group of Mexican juvenile offenders, 23 per cent used inhalants. Gender, low socioeconomic level and labour status were the principal risk factors associated with VS use. The authors state the following:

"The use of inhalants has spread mainly among children from the poorest areas. The economic crisis in many underdeveloped countries has meant that many children and adolescents have to contribute to their family incomes. Because of their age, they have to do many tasks such as washing windshields or cars, hawking items on the street, carrying groceries at supermarkets, or even begging."
The study shows:

increase of inhalant abuse for those that reported some kind of labour activity and belonging to low socioeconomic strata. Having to work at an early age, which in a way might bring more economic accessibility, probably increases the risk of drug abuse and delinquent behaviour.

The authors continue:

"Parental abuse elevated the risk of inhalant abuse ... being a gang member and wearing tattoos also increased the risk of inhalant abuse. Dysfunctional families often force children to move away from home and to value behaviour that removes them from conventional society. These youngsters often feel rejected by abusive parents, forming groups (gangs) in which they feel accepted” (Tapia-Conyer et al., 1995).

It is reported that membership in such groups frequently involves substance use.

Some countries have conscripted armed forces whose membership is drawn from among its youth. These groups might be particularly vulnerable, in a relatively closed institution, to group pressure to use VS, particularly where acquiring other substances may be more difficult. Although there is anecdotal evidence of the extent of VS use in such circumstances, there seems to be little activity in tackling this issue.

VS use and criminality

There is evidence that VS use is associated with criminal behaviour but the cause of such association is not clear. Since illegal substance use and VS use may be linked (although not exclusively) to criminality, it is important to draw on the extensive research conducted in this area. A UK Home Office study, Young People and Crime (Graham and Bowling, 1995) concluded that the focus of measures aimed at reducing young people’s involvement in crime should be:

- strengthening families – for example, by parent training, family centre and support groups, and specific measure for lone parents and step-families;
- strengthening schools - for example, by strategies to prevent truanting and developing practical measures to improve family - school relationships;
- protecting young people (particularly young men) from the influence of delinquents in their peer group and from high risk activities such as alcohol and drug use;
- harnessing the sources of social control within the criminal justice system to the more informal sources of control found among families schools and neighbours;
- preparing young people for fully independent and responsible adulthood.

All these measures could also be useful in reducing problems related to VS use, and are in themselves worthwhile activities. However, they form a significant agenda that may need support from national and local governments and local communities to plan together and to deliver properly.

Since drug and VS use are linked to delinquency, a potentially fruitful location for delivering prevention messages is in the juvenile justice system. At the point of arrest, ‘arrest referral schemes’ give advice and counselling, and attempt to divert arrestees from the criminal justice system. If convicted, VS users may be given the option of treatment for their dependence, harmful use or related problems as an alternative to a fine or imprisonment. If they reach prison, VS users may be given the opportunity to stop using through being imprisoned in a drug-free part of the prison, where security checks are more rigorous, and where some counselling is available.
Resources for prevention

Much funding for prevention work in the substance use field comes from government, but manufacturers and distributors of inhalable products are also involved. For example, in the USA, the industry-supported Solvent Abuse Foundation for Education (SAFE) and the Chemical Specialities Manufacturers Association (CSMA) sponsor prevention/education initiatives aimed at both inhalant use and general substance use. A similar initiative was taken in the Basque Country, Spain, where the Ministry of Health, Secretary of Drug Dependence, together with industrial organizations in the energy sector, sponsored the production of a publication on VS and supported the implementation of prevention campaigns.

In the UK, the British Aerosol Manufacturers' Association (BAMA) has funded a number of progressive initiatives, for example, a recent publication by TACADE for primary schools, called Substance and Solution (TACADE, 1997). BAMA has also worked with their member companies in sponsoring local issues, for example, a theatre production for primary schools called Poor Ted (Ives, 1995). The British Adhesives and Sealants Association (BASA), a trade association including the major manufacturers in the UK, was involved in setting up the charity ‘Re-Solv’ which takes action on VS use throughout the UK. More efforts could be made to engage industries that sell inhalable products in developing countries.

Charitable foundations and trusts have an important role to play: the Joseph Rowntree Foundation in the UK is implementing a version of a USA programme, ‘Communities that Care’, whose main features include:

- a strong conceptual framework, linking social behaviour to the bonds that children form with their parents, their schools, their friends and their communities;
- insistence on securing active support from the ‘key leaders’ in a community who will assume ownership of the programme;
- a detailed assessment of the incidence of relevant risk and protective factors in the community as well as existing resources to identify priority areas for action;
- the implementation of interventions whose effectiveness has already been established by research (Utting, 1996).

International agencies can also play their part, particularly in identifying the problem and in assisting the interchange of information and the development of policies and programmes. The WHO Substance Abuse Department has kept the focus on VS use for a number of years (see below).

The Pompidou Group of the Council of Europe organized a seminar for countries in Central and Eastern Europe on the topic in 1993 and the proceedings were published (Council of Europe, 1994). As well as developing international cooperation on the subject by bringing together a number of experts from Eastern and Western Europe, the seminar identified some prevalence data from across Europe, and explored different approaches to treatment. More recently, the Pompidou Group conducted a consultancy of the issue in Poland and published a report (Council of Europe, 1996). This report identified VS use-related issues in Poland in the context of the use of other substances by young people. A two-day seminar of experts from across Poland and from other countries of Central and Eastern Europe debated the issues raised by the report and made various recommendations:

- on the need for improved data collection, especially concerning VS use-related deaths;
- on the development of ‘health promoting schools’ as a potentially effective way of tackling substance use-related problems at an early stage;
- on community-based prevention and the development of outreach work for hard-to-access groups of young people;
- on treatment, expressing concern about the residential treatment of VS users together with other, generally older substance users, and stressing the need for training in more varied intervention methods; and
on interregional cooperation, emphasizing the importance of regional support. In particular, a regional seminar on the role of the police was recommended.

The Pompidou Group continues to emphasize VS use-related issues in its work: for example, the Demand Reduction Staff Training Programme (which is training drugs workers from Central and Eastern Europe), includes consideration of VS use alongside other substances.

The European Monitoring Centre for Drugs and Drug Addiction (EMCDDA) takes account of VS use in its first annual report. This report points out that although the subject ‘tends to receive less publicity than the illegal drugs … lifetime prevalence is often h It is expected that the work of the EMCDDA and its National Focal Points (these are the agencies in each of the EU countries which channel data to the EMCDDA) on improving data flow, together with its work on harmonization of terminology, will lead to more accurate assessment of the level of VS use across the European Union.

But national governments carry most responsibility for preventive activities. In some countries this role is accepted (although not always provided with sufficient funding to make a difference to the problem). A variety of activities are required. For example, Kin and Navaratnam report that: higher than any other drug apart from cannabis … Though concentrated among relatively young adolescents, solvent misuse sometimes persists into later adolescence or young adulthood.’ (EMCDDA, 1996).

“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 organisations and are funded by the government. Support services include daily activities, drop-ins, street workers, referral to residential programmes, family counselling, and referral to addiction counsellors. Group work approaches have shown some success, community-based programmes are the most effective for the majority of young people” (Kin & Navaratnam, 1995).

Other countries have also implemented innovative and coordinated activities. For example, in Colombia, the government and NGOs have started a national programme aimed at reducing the problems of psychoactive substance use (including VS use) among street children. And in the Philippines there has been:

“a nationwide drug information campaign that covered solvent-inhalant abuse and provided street-based counselling services. The government, through the department of social welfare, has provided livelihood opportunities for street children who are inhalant abusers” (Kin & Navaratnam, 1995)

But government resources are seldom sufficient to deliver services, and, in any case, work with VS users may be a low priority. Sometimes, charitable agencies intervene. For example, the organization Casa Alianza works with ‘street children’ in Guatemala, Honduras and Mexico. They report that many of the children with whom they work use shoe glue (in Guatemala), ‘Resistol’ (in Honduras) and ‘Activo’ (in Mexico), a potent industrial solvent. Their projects aim to provide facilities for young street children and to act as advocates for them (e.g. Kobrin, 1996).

REDUCING ADVERSE EFFECTS

Given that prevention will never be totally effective in stopping everyone from trying VS use nor stop a smaller proportion from continuing to use, and realizing that some users will not be able to stop immediately, it is important to consider what other health messages can be provided. In a sense, this is a part of all prevention strategies (for example, product reformulation is an attempt to restrict the harm caused by particularly certain dangerous products), but there are some specific measures to be discussed.
Considering the difficulties in promoting any ‘safe’ use of volatile solvents, the UK Advisory Council on the Misuse of Drugs, which studied the issue, concluded that it was not sensible to suggest that certain kinds of VS use were ‘safer’ than others, and they suggested that the unambiguous message: ‘VS abuse is too dangerous - don’t do it!’ should underpin all prevention work. Nevertheless, recognizing that warnings were unlikely to be heeded by young people who decided to use VS and would unlikely discontinue use in the near future, it can be suggested that some substances were more dangerous than others. They concluded that there was not a case for such a strategy: ‘The evidence for different levels of harm for different substances is too weak to justify such an identification of greatest harm from specific substances’ (ACMD, 1995).

However, the report did point out that the practice of putting a plastic bag completely over the head to better absorb the fumes was especially dangerous and said that this should be pointed out ‘in robust terms’ to young people. It was also stated that a greater level of danger arose from spraying aerosols directly into the mouth (because of the greater difficulty of controlling the dosage, and because of the cooling effect of the cold gas on the throat). Having lighted cigarettes around while misusing inflammable substances was also especially dangerous. The additional risks arising from getting intoxicated in dangerous places should also be pointed out to young people.

In practice, many workers with young people would go much further than this in giving health advice. Although the scientific, empirical evidence is slim, many workers and young users have ‘street knowledge’ about particularly dangerous practices that can be shared and thus avoided. However, by their very nature these are uncertain and situation-specific and cannot be discussed in detail in a report such as this. In general terms, specific advice might include avoiding:

- particular products which appear to have had particularly damaging effects;
- particular products at certain times if reformulation has occurred;
- mixing psychoactive substances;
- heavy use over long periods;
- particular methods of use thought to be particularly harmful;
- particular ways of using (such as using alone); and
- particular places because of their higher risk (of accident or of attack).

There is also value in advice of a general nature such as ensuring that, as much as possible, the user does not neglect to eat and sleep and should attend to his or her health. However, in dire circumstances some VS users may find this advice not possible to act upon. Some descriptions of ‘withdrawal symptoms’ attributed to the cessation of VS use are sometimes more likely to be due to other health problems related to poor nutrition, lack of sleep and general poor health than directly to VS use-related effects.

**APPROACHES TO TREATMENT**

VS use is, for most young people, only a passing phase. Most adolescents who try inhalable products only do so a few times and a small minority who continue to use abandon VS use after a few months or years. For these, treatment may not be required. However, since even experimental VS use is potentially very dangerous (some 20 per cent - 30 per cent of UK VS use-related deaths occur in first time or near first time users), this can lead to disruption of family and community life, and criminal activity such as theft or driving a motor vehicle while intoxicated (Gjerde et al., 1990). It is important to identify early users and immediately start any intervention thought necessary.

Some young people continue to use these substances, perhaps heavily, and some may turn to alcohol or other substances in addition to, or instead of VS. For them, more comprehensive treatment and intervention may be required.
The immediate treatment of an intoxicated user requires a calm and firm approach. The product being used should be taken away (if possible) and fresh air provided to help to sober up the user. But the product should not be removed if this would lead to conflict. Evidence from the study of sudden VS use-related deaths indicates that exertion or high emotion may raise adrenaline to dangerous levels for an over-sensitized heart. Therefore an intoxicated user should never be chased and a calm atmosphere should be maintained. If the user collapses, appropriate first aid should be administered: in particular, the airway should be kept clear. It is unlikely that it will be possible to have a serious conversation with a severely intoxicated user, but calming and reassuring talk may help. After 5 to 20 minutes without inhalation the user should begin to sober up, unless alcohol or other substances have also been used.

Subsequently, the user may need medical help. A check up may identify particular health problems. Jumper-Thurman and colleagues (1995) argue that:

"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. ... 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. Acute medical intervention may be needed for these problems, but there also may be sub-clinical patterns that will be resolved over time with cessation of solvent use. The acute neurological effects also may take considerable amount of time to resolve."

Being lipid-soluble, solvents ingested by inhalation may be detectable in the body tissues for some weeks and even months after the cessation of VS use, and has no indication that they have any psychoactive effect. There is no clearly defined withdrawal syndrome, although this has not been well studied, particularly in settings where chronic use for several years is prevalent; special detoxification regimes may not be necessary, but rest and sleep, and fresh food and vitamin supplements may complement general supportive therapy for recovery. Counselling may also be helpful but more specific treatments have not been yet evaluated.

Experimental or occasional use of VS may occur mainly out of curiosity or in response to pressure from (or entanglement with) peers. But chronic, long-term use has different underlying causes. It may be that biological factors are implicated in a predisposition to dependent or harmful use, and although we do not yet know enough about the physiology of the brain to make definitive statements about this, there are certainly some suggestive findings in relation to other substances (e.g. Concar, 1994). However, chronic VS use is nearly always a response to life’s difficulties. As the UK organization, Network VSA (1997), puts it:

"Persistent misuse of volatile substances is a complex behaviour that is frequently associated with low self-esteem, family problems, isolation and psychological difficulties. These are also factors that may also be associated with the problematic use of legal and illegal drugs, and indeed, a large proportion of people who misuse volatile substances also misuse other drugs. Chronic VSA is thus intertwined with social and psychological problems and with the misuse of illegal drugs. Therefore, counselling services for young people should not be narrowly focused on volatile substances, but should be able to deal with VSA in the context of a range of problematic behaviours."

Often, other problems need attention first, and until these are dealt with, the user may not be able or be willing to give up, even if he or she recognizes the harm VS use might be doing. Consequently, giving help to young VS users is best done by generic services for children and young people who can deal more effectively with these broader problems, supported where necessary by specialist agencies. Primary Health Care settings and other community services are therefore in many cases the best places for implementing treatment of VS users. However, generic professionals are frequently reluctant to deal with VS users. For example, Jagger describes how social workers in Scotland avoided engagement with young users through a process of defining them either, on the one hand, as 'normal' (and therefore not requiring social work intervention) or, on the other hand, as 'pathological' (and therefore beyond the scope of social work intervention and requiring psychiatric assistance).
In this way, social workers’ reluctance to deal with VS users could be justified by recourse to a professional discourse which defined them as ‘not a social work problem’ (Jagger, 1997).

Various approaches, offering different treatment options, can be used. But, ideally, these should:

- be appropriate to the needs of the user;
- be delivered by a practitioner with expertise in the chosen method;
- have clear and realizable goals;
- have defined boundaries (for example, of time);
- be adequately funded; and
- involve ‘significant others’, particularly the family and the peer group, where this is appropriate.

Jumper-Thurman and colleagues put it like this:

“...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-abuse 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 et al., 1995).

Individual or group counselling may be appropriate and has been conducted from a psychotherapeutic or behavioural perspective. Where there are family problems associated with VS use, and where the practitioner is experienced to work with families, counselling or family therapy may be offered (Ives, 1989). Self-help groups along the lines of alcoholism support groups, and peer support groups have shown great promise. Some successful schemes have been community-based. Temporarily removing young people at risk from their local area and providing them with alternative activities, such as outdoor pursuits, may be particularly effective where the home or community environment is grim.

Jumper-Thurman and colleagues (1995) discuss treatment approaches in some detail, and point out:

“The treatment and prevention of solvent abuse and dependence have 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 substance-abusing youth frequently bring a multitude of other problems - academic, legal, social, and family issues. Certainly, volatile substance abusers are among the most difficult and refractory people to treat. In addition to the difficulty of working with this population, little practical information has been available to meet the specific needs of solvent abusers”.

VS users are thought by many workers to be particularly a difficult client group to contact and to motivate to change. This is partly due to their relative youth, and the inexperience of many health workers in dealing with young clients. Harwood et al. (1995) in indicating some of the difficulties, reinforces these points:

“There is no treatment modality or defined therapeutic approach for inhalant abuse, and there are extremely few treatment programmes directed at inhalant abusers. Nationally [in the USA], there are only about 2500 to 5000 persons with primary inhalant abuse problems admitted to various types of
substance abuse treatment programmes per year. There is no knowledge about how these patients function in different kinds of treatment programmes, what their retention is, most critically, what their outcomes are. This is an area where research may have pay off in terms of identifying practitioners and programmes 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 numbers of inhalant abusers that present for treatment annually.”

Identifying effective treatment modalities is therefore difficult. Nevertheless, it is possible to draw on what is known about what works with other substance-using clients and to consider whether these techniques are applicable to VS users. For example, psychotherapeutic approaches often used in substance use treatment may be less appropriate when dealing with young clients who have had less time to develop insights into their behaviour. Nevertheless psychotherapeutic approaches that are not so heavily oriented towards the ‘talking cure’ (such as psychodrama and art therapy) may be effective. A popular model in the substance use field is Prochaska and Diclemente’s ‘revolving door’ model of stages of change in substance using (Prochaska & Diclemente, 1986). The stages include ‘pre-contemplation’, ‘contemplation’, ‘action’, and ‘maintenance’. This model can helpfully be applied to VS users.

Jumper-Thurman and colleagues (1995) suggest that peer approaches may be particularly effective:

“Information from both patients and providers indicate that, when admitted for treatment, solvent abuse children are distant and hard to reach. However, they are anxious to bond quickly to their peer group. Some treatment facilities have utilised this as an opportunity for treatment and have developed a ‘peer patient advocate’ system. 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”.

‘Peer approaches’ play an important part in the treatment for VS users. They have a number of advantages, including:

- peers are more likely to be able quickly to get in contact with VS users; they may be part of their social circle, or can gain more easy entrance to it;
- in a fast-changing world, peers are more likely than older people to understand the culture of the young user and be able to communicate effectively;
- partly for this reason, they are more likely to have credibility with substance users, particularly if they themselves have used or are using VS or other substances;
- using peers can be cheaper than other options; and
- the peer workers themselves can be helped by their involvement in peer support.

However, there are important issues of management. A useful pamphlet sets out guidelines on using peer interventions (North Thames Peer Intervention Forum, 1996). Two research studies in the UK commissioned by the Drugs Prevention Initiative identify some of the successes and difficulties of peer approaches in primary and tertiary prevention (Shiner & Newburn, 1996; Klee & Reid, 1995).

Examples of treatment approaches from the UK

The results of various approaches to working with solvent users in the UK have been collected in three publications from the National Children’s Bureau (Ives, 1986, 1989, 1990). A self-study manual for professionals on the subject also discusses a range of interventions (Ives, 1995a). The following summaries – of ‘individual approaches’, ‘group-work approaches’, ‘using young people’s experience to help others’, ‘multiple approaches’ and ‘empowering communities’ – are taken from these publications.
Individual approaches

Currently, in the UK, there are three funded agencies working locally with solvent use problems and are all based in the North-West of England. Re-Solv, the UK national charity concerned with VS use, appears no longer to be working with individual users and their families, although this has in the past been part of their activities. There are also various unfunded groups, often set up by bereaved parents whose child has died of VS use, who are trying to take action on this problem. The three funded groups work with individual users and their families, but in different ways. The ‘Wirral Committee on Solvent Abuse’, as well as working in schools and youth projects, offers individual outcome-focused counselling using a ‘brief therapy’ model. They also offer diversionary activities for VS users and former users, such as adventure weekends. The ‘Hathershaw Solvent Misuse Project’ focuses more on the power of the group to initiate and sustain change, while the third group, the ‘Solvent Abuse Resource Group’, places much emphasis on working together with agencies concerned with the use of illegal substances. The University of Newcastle used individual counselling from psychology students, with the focus on the work with the family as well as with the individual VS user (O’Connor, 1989).

A behavioural approach to tackling VS users’ habit has been described by Barlow (1995). He suggests that each piece of behaviour has an antecedent and a consequence, and that, while it is difficult to alter behaviour directly, antecedents and consequences can be manipulated more easily. Antecedents that might be susceptible to change include the time of use, the place of use, the mood of the user, the company that she/he is in, and the availability of the means to achieve intoxication. Some common consequences are, he suggests peer group rewards, stress reduction, the intoxication itself, the attention that the behaviour may elicit, and physiological and cognitive effects. This analysis indicates a number of points for possible intervention. For example, if it seems that stress reduction is an important and looked-for outcome for a VS user, they could be helped to use alternative and safer methods to reduce their stress.

Group-work approaches

Since many VS users use these substances as part of a group, and for many groups VS use represents a major activity, it makes sense to tackle the problem at the level of the group. Kilfeather and Parker (1995) used this approach with a group of VS users who were causing problems in a London housing estate. They used therapeutic group-work techniques founded on a basic caring and nurturing attitude that emphasized establishing and holding boundaries and enabling the group members to take decisions for themselves, both collectively and individually. Much of this was done through activities such as pool, swimming and trips out of London. The limitation of this approach was that some individuals needed to ‘escape’ from the group before they could quit their habit. The workers enabled this by also conducting individual work with some group members.

Using young people’s experiences to helping others

‘Glue Anon’ was a group of ex-VS users who met and talked with current VS users, helping them to stop the habit. The young ex-users were able successfully to contribute their own experience of VS use and the way they felt about it in order to help the current users to understand why they were doing it. Although this was a lengthy process requiring professional support, it was fundamentally successful because of its structure, which the author says:

"enabled the members to realise their considerable potential for self support and for providing support for others. The structure was non-hierarchical, which enabled the members to establish a self-determining group that respected the members regardless of age, experience or professional status. This is an unusual situation in groups organised by professionals who, for the most part set their own agendas and act as leaders, sometimes overtly, and sometimes covertly. It should be of crucial importance to those working with people to 'start where the client is at' when considering what type of help is most relevant to the individual."
Often, professionals think they know what is best, but this is largely due to their lack of sensitivity and understanding of the client’s perceived needs. The thought of being guided by a client is often very threatening to a worker because it seems to imply a loss of control and a loss of power. Adopting a ‘client-centred’ approach is often talked and written about but very rarely acted on, but it is vital to work in this way for as Ken Heap puts it: ‘the worker is rarely the major agent of change. This is the function of the group itself. Fundamental to the group work method is the liberation and the mobilisation of members’ own ability to help themselves and each other through participation in the group. To this end, they cooperate in discussing common problems.’ Glue Anon worked because it took this approach seriously” (Salamon, 1989).

David Mann and Grant Blackwell, who worked in an ‘intermediate treatment’ project in the UK (intermediate treatment is an alternative to custody for young offenders or those at risk), also worked with users’ experiences of VS. With a group of VS (Mann, 1989) users, they utilized the group’s experiences of VS use to identify the reasons for use and the pleasures and problems of use in order to chart a route away from VS use and from criminality. The project was a group-work-based and ‘offence-focused’ using a ‘correctional curriculum’ as well as social skills elements, and an activity-based compensatory programme. There were also individual therapy, casework and counselling, and, in parallel, family therapy. A contract was made with both the individual and the group, including rules and regulations such as not inhaling in the group, no weapons, and respect for property. The group decided these rules themselves.

The workers’ approach to dealing with inhaling was nonjudgmental and discussion was facilitated by listening to the young people and allowing them to talk about their solvent use in their own words, encouraging them to find their own solutions to problems and defending them against criticism from other adults. They looked at what the best products were, where they inhaled, how they inhaled, what the effects were, and so on. The workers then helped the group to move on to look at the good things that would happen if they were to give up inhaling VS. These included more money, a longer life, better relations at home, less risk of care and custody, less hassles from the police and the community. They also looked at the bad things about inhaling and the effect it had, not only on the group members, but on their friends and relatives. They explored how inhaling affected other people’s attitudes towards them, and also looked at the bad things that might happen if the group continued to inhale. They also employed harm reduction strategies for the members who carried on inhaling such as advising the inhalers not to use large plastic bags.

A multiple approach

A project in Bradford in the North of England provided five elements of a service for their VS-using clients. First, information, advice and guidance to the clients, their relatives and friends and especially to professional workers such as teachers, social workers and so on. Second, counselling and individual casework, which was grafted on to a community approach designed to help clients achieve insights and promote change. Third, training activities geared to the needs of other professionals who were working with them. Fourth, a short-stay residential unit maintained by the project to provide a supportive environment where residents could develop social and life skills during a stay of 3 - 6 months. The fifth element was work in the community, which involved a key worker on a local estate, training of primary health care workers and having key workers in the community (Robertson, 1989).

Empowering communities

Empowering communities is the theme of much work that is based on the insights of Paulo Freire, and this approach was used in an innovative project described by Maggie Jackson (1995). She worked with a small group of male sniffers who as she described, ‘had been treated as outcasts and unworthy of anyone’s attention. The extent of their suffering by such oppression is not detailed here, but because of it there was great difficulty in establishing dialogue with them’. To emphasize her point, she quotes Paulo Freire:
"This is the consciousness of the oppressed. With no experience of dialogue, with no experience of participation, the oppressed are often unsure of themselves. They have consistently been denied their right to have their say, having historically had the duty to only listen and obey. It is thus normal that they almost always maintain an attitude of mistrust towards those who dialogue with them. Actually this distrustful attitude is directed also towards themselves. They are not sure of their own ability. They are influenced by the myth of their own ignorance" (Freire, 1973).

Maggie Jackson attempted to develop dialogue between herself and the VS users, and through her, between the VS users and their community. In this way:

"these young 'marginal people', these embodiments of despair, became a catalyst for arousing the awareness of their peers, of their families, of their neighbours, of local officials and of professional workers. All gained an awareness of what the plight of these 'sniffers' signified, which was the reality of a despairing community".

So Jackson was able to assist this group of young people to become key agents for change in their community. She quotes Jean Vanier, who says that there is 'something prophetic' in people who seem marginal and difficult - 'for they force the community to become alert because what they are demanding is authenticity' (Vanier, 1979). She was able to do this by following Vanier's ideas:

"If they are to re-find hope, marginal people have to feel loved and accepted. It is not simply through being welcomed that they will rediscover their own value and capacities for positive action. They need people who will listen to them, with all their wounds and needs, and sense what they really want. This demands time and patience, because they are afraid of revealing themselves and won't open up to just anyone. They need to sense that they are not judged, but really understood. They need someone who can listen to them, a stable reference who can guide and support them and bring them security, who can encourage and help them to discover their abilities and take on responsibilities" (Vanier, 1979).

In time, their VS use stopped and they applied for and received a grant from a charitable trust to enable them to make a video. The experience of making the video gave the group a focus and gave them confidence. It also allowed them to represent themselves to the wider community. Subsequently, some found jobs and others became volunteers in the community centre. As Jackson puts it: 'These young adults experienced the process of conscientisation which freed them from a paralysed state of what Freire calls 'non-being'.

With this aim, primary health care settings and other community services have to be used for several interventions which are not adequately dealt with: after care, rehabilitation, social reinsertion, relapse management, engagement of families and long term follow-up.

Treatment approaches with special groups

Special groups need special treatment. Approaches appropriate for some people will not necessarily be directly transferable to others. For example, traditional substance use treatment services are often oriented towards older users of psychoactive substances and many are not well equipped to help young VS users. The multiple problems experienced by street children go beyond substance use, and need addressing more holistically. Many groups, particularly indigenous peoples, have different and special problems with substance use that requires particular attention. Their important cultural differences must not be neglected, and treatment should work 'with the grain' of the culture, rather than imposing inappropriate treatment models that are alien to the culture.

Street children

For street children, VS use will generally not be their most pressing problem. Other priorities, such as food, avoiding violence and finding somewhere to stay will be more to the forefront of their minds, and VS use may
be a response, an attempted solution, to these problems. Little progress on dealing with the problem of VS use is likely unless these underlying issues are tackled previously or simultaneously.

The organization, *Casa Alianza* (1996), works with street children who have multiple problems, including chronic VS use. In Guatemala, the organization has a substance treatment programme in the country’s highlands. Children from the city streets go there to recover from their dependence on glue. One resident commented: ‘I'm not at all like I was when I was sniffing. It's like the world was totally apart from me. Now the world is with me. I can touch people’s lives and they touch mine’. Medina-Mora and Berenson (1995) report that in Mexico, institutionalization has been the usual response to VS problems. However, more recently a deeper understanding of the needs of street children has resulted in the development of ‘open-door institutions’ where children are free to enter and leave as they please, although while inside they must observe the rules.

The WHO Project (WHO/PSA/95.12) recognizes the significant role of substance use in the lives of many street children, and attempts to deal with it in the context of a holistic approach to the problems that street children experience, which go far beyond the use of psychoactive substances. The Project works with the ‘Modified Social Stress Model’, which takes account of the broad range of risk and protective factors that are associated with positive and negative outcomes of particular behaviours. The terms ‘risk behaviours’ and ‘situations’ denote, respectively, the personal behaviours and the external environmental factors that can lead to health problems. The Modified Social Stress Model suggests that substance use by a street child is more likely if:

- the child’s level of stress is high;
- substances are considered normal or encouraged within the child’s reference groups;
- the chosen substance produces a wanted effect;
- the child has few, weak or negative attachments;
- the child has few or poorly developed competencies and coping strategies; and
- few personal or community resources are available and accessible.

A careful analysis of the balance of these six factors at any point in time helps to identify the issues involved in the substance use of that particular child.

The Modified Social Stress Model gives a framework for understanding substance use. But the WHO Street Children Project also indicates the importance of assessing a child’s *pattern of use* and their *potential for change*.

Potential for change is assessed using Prochaska and DiClemente’s model of change discussed earlier in this document.

So-called ‘Western European’ approaches to treatment are not eschewed but are incorporated. Intjartnama calls this ‘a bicultural approach’. As the founders put it, ‘Wherever possible, aboriginal cultural values are being made clearer and reinforced. At the same time European treatment methods are being used, learned from, adapted and incorporated into the aboriginal family model’.

Individual case assessment will identify areas for interventions, but how these interventions are pursued will depend on local circumstances. Interventions must take account of the social and cultural patterns of street children’s lives. They must also be community-based, and seek to involve peers in their implementation. Interventions aimed at substance use problems should be part of broader-based interventions aimed at improving the life and health of street children in other respects.
The WHO Substance Abuse Department emphasizes the importance of the active participation of street children in programmes. Also emphasized is the importance of monitoring and evaluation, particularly in gaining feedback from the children and young people themselves through the use of evaluation questionnaires and focus group discussions.

**Indigenous peoples**

Across the world, indigenous cultures also have useful perspectives and approaches that can be utilized in treatment of people with VS and other substance use problems. For example, workers with native Australians stressed the importance of working with native Australian culture when dealing with substance use problems. An account of work in progress at Intjarnama outstation located approximately 110 kilometres west of Alice Springs in Australia’s Northern Territory is particularly interesting (Cook & Cook, 1997). Here, alcohol users and petrol inhalers are treated together.

They describe the project as follows:

> Intjarnama is a therapeutic community which works in many ways. It operates as a family group, and not as an institution. It operates as an aboriginal family system which ... is familiar to and comfortable for aboriginal people. (Why should it be any other way?) ...

The aboriginal family model when it is functioning properly is very complex. It provides a well-balanced environment for people to grow up in. The aboriginal family system places the highest value on relationship. All members of the group have a place, a status and a responsibility to the land, the family and to cultural vitality (the Dreaming and the ceremonies). There is also a toughness and, according to law, a strict system of accountability. The Intjarnama therapeutic model is based upon this aboriginal family system. It could not be otherwise. It would be foolish to expect an aboriginal therapeutic model to be based on European family systems or upon European institutional systems. We must say this because people unthinkingly often expect that an aboriginal recovery programme should be the same as a European programme.

The purpose of the project is 'to develop and run an aboriginal rehabilitation unit and to revive and preserve the aboriginal culture of clients and families participating in the programme, with minimum of government sponsorship'. There are five principles of culture: ‘(a) Land, place and country; (b) Tjukurpa-dreaming/lore; (c) Spirit; (d) Family; (e) Taking care.’ The project thus has multiple purposes. Another significant feature is that the indigenous people themselves control it.

Obot (1995) reports that Nigeria is traditionally tolerant of minor behavioural deviations, so than only very serious cases of substance use are viewed as ‘problems’. The role of traditional healers in treatment is being explored.

The WHO Substance Abuse Department has also started the Indigenous Peoples and Substance Use project as a means of empowering these communities and giving them the responsibility and control over their own health. Substance use problems are one of the major social and health issues facing Canada’s Aboriginal peoples, for example. There are now several treatment and prevention programmes for VS use problems, as well as research initiatives funded by Health Canada. There are more than 895 beds across several indigenous communities to deal with more chronic problems related to VS use. At the core of several of the treatment and prevention initiatives are culture and spirituality with emphasis on the re-introduction and practising of traditional ceremonies as a part of the treatment (and training of staff). Traditional healing practices and philosophy are seen by many aboriginal people as the foundation for community wellness and empowerment, and such practices need to be part of both training and treatment.
Gender perspective

Although not a ‘special group’ in the same sense as the previous two, girls and women group is frequently neglected and require special mention. Female substance users are a neglected group, partly because a blinkered idea of femininity regards substance use as incompatible with it. But, as described earlier, the prevalence of experimental VS use among girls and young women is often found to be similar to prevalence among boys and young men. Female substance users may suffer additional stigmatization because of prevailing ideas about the role of women, and intoxicated females may run greater risks of physical and sexual abuse. Because female substance use may be less visible, girls and women are a more difficult group to contact. And because they females tend to carry a greater burden of work and family responsibilities, they may have less free time to take part in treatment activities.

All these difficulties are superable, but require careful thought when treatment programmes are being planned. In order to access this group, it may be necessary to employ female workers. It is important to ensure that any diversionary activities planned appeal to both sexes. The role of the family in treatment may be even more significant.

Beyond treatment

Follow-up after treatment is an often neglected part of the process. Aftercare, long-term rehabilitation, social reinsertion, relapse management, and follow-up of discharged patients are important aspects of the whole treatment process. Jumper-Thurman and colleagues (1995) stress this:

“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. ... therefore, it is important to include community resources and educational staff (i.e. teachers and counsellors) early in treatment. This liaison should be strengthened throughout the therapeutic process and used intensively in discharge planning. It is essential that the youth and families have an awareness of the community resources available to them; they should also feel comfortable using these services”.

Relapses should be treated nonjudgmentally, not as ‘failure’ but as an opportunity for learning. Support in maintaining improvements in VS use may be helpful. The Wirral project in the UK organizes weekend events for ex-VS users to help them to maintain abstinence and to utilize the support of the group.

Taking a broader view

There is a danger when focusing on one issue such as substance use, that the problem is seen as mainly located within the individual. But it is important to emphasize the need for healing the whole community, or to make changes in the wider society. The pathological aspects of VS use are not merely the result of individual pathology, but of failures in social structures.

Of course, most projects recognize this: the Injartnama community realized that they needed to build an appropriate community context for treatment; the Bradford Drug Project saw the need for a multiple, community-based strategy; the WHO projects emphasized these aspects; while Jackson used the work of Paulo Freire to locate what she was doing within an analysis of the community. However, funding is often given for more specific and targeted work, and it is sometimes difficult to convince funders of the need for a broader approach. Communities may also be resistant to this approach, for they may feel that they have identified the ‘problem’ and just want it dealt with, without having to face up to the more complex and underlying problems. Some community leaders may feel that their position is threatened by a thorough ongoing analysis of all the issues.
Workers and volunteers, too, trained in particular disciplines, and with a focus on certain groups, may be reluctant to take a broader view.

A greater awareness of the reasons why a broader approach is logical, cost-effective and likely to lead to more lasting outcomes would help to reduce this resistance. The philosophy of this approach could usefully be presented in a more understandable way, and examples of work based upon it could be more widely disseminated. The second part of this document will outline a comprehensive approach which hopefully can be adapted by individual countries according to their situation and problems.

**MONITORING AND EVALUATION OF INTERVENTIONS**

However, while this broader view is absolutely essential, it makes evaluation of interventions much more difficult. The results of work with multiple aims and multiple outcomes are hard to assess. Nevertheless, evaluation and monitoring are so important and so often neglected or paid too little attention that it needs careful thought and planning.

The National Institute of Drug Abuse (NIDA) calls for theory-driven evaluation research of the efficacy of prevention and treatment programmes, pointing out that: ‘the population at greatest risk are the young, disadvantaged and disenfranchised. The circumstances that have made this marginalized population uniquely vulnerable to VS use and its severe consequences also have made the need for research efforts and successful interventions all the more urgent’ (Jumper-Thurman et al., 1995).

Evaluation that is driven by theory needs to take account of, for example, the rather unencouraging findings about the efficacy of educational interventions in reducing substance use. It needs to recognize that identifying change may require sophisticated measures that go beyond simple calculation of a reduction in, or abstention form, substance use. It needs to be able to cope with multiple and changing aims.

Evaluation is not something that takes place only at the end of an intervention. It needs to be built in from the start and used to inform the intervention throughout its life. Looked at in this way, evaluation is not a separate activity but is part of the process of intervention, for the reflection that evaluation encourages helps to make the intervention more effective. Evaluation is thus part of what Donald Schön calls ‘the reflective practitioner’ (Schön, 1993). In order to best assist the people with whom they work, workers must give attention to the detail of their own behaviour and reflect on it. This helps them to identify the positive and not-so-positive aspects of their interventions. They can then attempt to alter aspects of their behaviour that appear not so helpful, and develop aspects that are. Donald Schön calls this ‘reflection in action’.

Reflection in action operates at many different levels. Least formally, it happens every time workers talk about their work. More institutionalized reflection might be a team of workers having a regular time for communal reflection on their work. At its least objective, reflection in action explores the personal and the interpersonal, taking full account of feelings, hunches and other subjective information. At the other end of the continuum, reflection in action utilizes the methods of social research, with, for example, interviews, questionnaires, and focus group discussions measuring process and outcome. Process measures (such as the number of people who have been in contact with the project) chart the way that the project has been conducted, while outcome measures (such as the number of people who appear to be in some way better off for the existence of the project) attempt to identify its effects. While these more ‘objective’ measures are essential, particularly in gaining credibility with funding bodies, it is important not to neglect the less formal and less ‘objective’ measures.
CONCLUSIONS

The use of VS remains a widespread problem across the world. The extent of health-related damage is not quantifiable due to inadequate data, the chemical complexities of the multiplicity of substances involved, and the extent of polysubstance use. However, it is clear that there are serious health risks even with experimental use of VS.

The problem can be tackled at many points:

- there are aspects of the supply of volatile products that can be addressed, particularly where supply is aimed not at the intended consumer of the substances, but specifically at those who will use the substances to achieve intoxication;
- demand reduction strategies (particularly through education in schools and elsewhere) although not convincingly shown to be effective, are worth further efforts. Broad-based life skills education shows special promise;
- harm reduction strategies that focus on reducing the risk of VS use can be controversial, but are essential for improving individual safety and public health;
- treatment for VS users can take many forms but must be culturally appropriate; and
- long-term care and rehabilitation are required for some users and need to be community-based.

However, it is important not to view VS use in isolation from the other problems that beset a community. Too narrow a focus on the problems of substance use will mean neglecting other damaging aspects of VS users’ lives, such as violence and sexual exploitation. It will also mean that the needs of the whole community may not be fully addressed. Tackling issues at the community level will help to strengthen communities as a whole, and enable them to find their own solutions to the multiplicity of problems besetting them.

The most effective way of doing this is to help communities to identify their own problems and needs and – with support – develop ways of dealing with them. Solutions cannot be imposed and workers must operate ‘with the grain’ of the indigenous culture. Practically, this means making good use of the experience and skills of local workers and volunteers. But since their skills will need further development, training is a key task.

Finally, with increasing globalization, the experience of particular communities – while unique to them - must not be seen in isolation. Similar pressures (for example, lack of employment opportunities, environmental degradation, disease and other threats to health) exist worldwide and have similar underlying causes. Ways must be found for representing the experiences of marginalized communities and their struggles to change so that all can learn from them.
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