



Trends in Death Associated With Abuse of Volatile Substances 1971 - 2004

Division of Community Health Sciences

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INTRODUCTION

This is the nineteenth annual statistical summary of data on trends in deaths associated with the deliberate inhalation of volatile substances. Data for 2004 are included here for the first time, together with updated information for earlier years, so Report 19 supersedes all previous reports. There is necessarily a delay of more than twelve months between the end of a calendar year and publication of our annual report. This is to allow time for details to become available from HM Coroners and from the Office for National Statistics (ONS), and the General Register Offices for Scotland and Northern Ireland.

The terms “glue sniffing” and “solvent abuse”, which were commonly used in connection with volatile substance abuse, have for some years been inadequate to describe the problem, hence our adoption of the term “volatile substance abuse”. Another term widely used is “inhalant abuse”. We define volatile substance abuse (VSA) as the deliberate inhalation of a volatile substance (gas, aerosol propellants, solvents in glue and other solvents) to achieve a change in mental state.

Our data set includes deaths from 1971 onwards, and our methods of data collection have been stable and systematic since 1983. For some analyses all deaths have been used. For examining some time trends only the period of stable data collection has been used (1983-2004), whilst for others only the most recent ten-year period has been included. Details of statistical methods used in the analyses may be found on [page 20](#).

Our information for England and Wales is provided from the following main sources: HM Coroners, Office for National Statistics, the Medical Toxicology Laboratory, Guy's and St Thomas' Hospital Trust, and press clippings agencies. For Scotland, information is supplied by the Crown Office and the General Register Office for Scotland. Details of Northern Ireland deaths are provided by the State Pathologist's Department, HM Coroner for Northern Ireland, and the General Register Office for Northern Ireland. The Deputy Viscount in Jersey, HM Greffier in Guernsey, and the High Bailiff in the Isle of Man supply information for their areas.

Data on "all cause" mortality and population estimates are supplied by ONS, and the General Register Offices for Scotland and Northern Ireland.

The criteria used for classifying deaths and details of how we collect the data may be found in the publications listed on [page 19](#). [Figure 1](#) shows the flow of collection and dissemination of data.

ACKNOWLEDGEMENTS

The register of Volatile Substance Abuse deaths is funded by the Department of Health.

This report is based upon earlier reports and we acknowledge the contribution made by previous members of the research study, particularly Jennifer Taylor and Martin Bland.

For England and Wales we wish to thank all HM Coroners and their staff who notify cases to us, the Office for National Statistics for providing death certificates, the Medical Toxicology Laboratory, Guy's and St Thomas' Hospital Trust, and the British Aerosol Manufacturers' Association for giving us access to their information, and the Health and Safety Executive and the Railways Inspectorate for liaison over workplace deaths where necessary.

For Scotland, we wish to thank the Crown Office for providing information on Scottish deaths, and the General Register Office for Scotland for providing death certificates.

For Northern Ireland, we wish to thank the staff of the State Pathologist's Department for ascertainment, the General Register Office for Northern Ireland for death certificates, and the staff of HM Coroner for Northern Ireland.

We wish to thank the Deputy Viscount in Jersey, and HM Greffier in Guernsey whose assistance enables us to include information for the Channel Isles, and the High Bailiff and Coroner of Inquests for the Isle of Man.

KEY FINDINGS FOR 2004

- There were 47 deaths associated with volatile substance abuse in 2004, the lowest annual total recorded since data collection methods were stabilised in 1983. The number of deaths in 2003 now stands at 53, bringing the total number of VSA deaths in the UK since 1971 to 2,152.
- Since 1992 there has been a significant fall in deaths, from an average of 77 per year in 1993-1998, to an average of 62 per year in 1999-2004.
- Gas fuels continue to be associated with the majority of deaths. In 2004, butane from all sources, including aerosol propellants, accounted for 79% of VSA deaths (37 of the 47 deaths).
- VSA deaths in under-18 year olds have risen from nine in 2003 to thirteen in 2004. Eight of these thirteen deaths were associated with butane cigarette lighter refills, the sale of which to under-18s is prohibited by legislation.
- VSA deaths continue to be more common among males than females. In 2004 there were over four times as many male as female deaths overall, but in the under-18 year olds, this ratio fell to just over two to one.
- In 2004 for the UK, among those aged 10-15 years there were eight deaths associated with VSA compared with three from drug misuse.

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COMMENTARY

Mortality associated with the abuse of volatile substances (VSA) is related to many factors, including the chemical nature of the substance itself, the product containing it, the method of inhalation and the prevalence of abuse. We have been collecting data on deaths in a systematic way since 1983.

The purpose of this report is to monitor trends rather than to provide an exhaustive commentary. More detailed analyses of some of the data have been the subjects of separate papers. When looking at trends and mortality rates it important to remember that they are subject to greater random variation when the numbers are small.

When further cases or additional data for previous years come to light they are added to the data set. Two such deaths which occurred in 2003 have been included in this report, increasing the total for that year to 53. Deaths can also be removed from the dataset if subsequent information puts them outside our criteria. Any important revisions are noted in our reports.

The dataset includes cases where there is no direct toxicological proof, but circumstantial evidence of varying grades suggests that these deaths were associated with volatile substance abuse. It also includes cases of suicide where a volatile substance was used to bring about death. All such cases are coded accordingly so that they can be reviewed if necessary.

TRENDS IN TOTAL DEATHS PER YEAR

The total number of deaths between 1971 and 2004 was 2,152. During 2004 there were 47 deaths. [Figure 2](#) gives the total number of deaths for each year.

Earlier reports included analyses of the monthly number of deaths before and after the Department of Health's advertising campaign of February 1992 aimed at parents. The final analyses (in Report 17) were based on data for England, Wales and Scotland (i.e. the areas that received the full campaign) between 1983 and 2002, thereby including an adequate 10-year period of follow-up. For under-18s deaths after the campaign fell significantly - by an estimated 62% from the number predicted by the underlying trend¹. The estimated fall of 19% among adults was not statistically significant². Since the campaign ([Figure 3](#)) there has been a further significant fall in the annual totals of all VSA deaths³, from an average of 77 per year in 1993-1998 to an average of 62 per year in 1999-2004.

There has been a continuing programme of health education, along with personal and social education in schools, addressing the issue of volatile substance abuse.

¹ P<0.001 (95% CI: 50% to 71%)

² P=0.10 (95% CI: -4% to 38%)

³ test for linear trend in log(yearly totals), P<0.001; test for quadratic trend P=0.02

AGE

VSA deaths comprise an important proportion of all deaths in young people, as death from any cause in this group is rare. In 2004 the youngest person to die was aged 12 and the oldest (a suicide) was aged 66. [Table 1](#) presents the age distribution of VSA deaths. This shows that from 1971 to 2004, half of all VSA deaths occurred in the under-18 age group. The median age was 18 years with an interquartile range of 15-23 years.

Changes in the age distribution are illustrated in several ways. [Figure 4](#) shows a shift in the distribution of deaths towards higher ages, when 2004 is compared with the period 1971-2003. This shift is highly statistically significant⁴.

[Figure 5](#) shows the cumulative distribution of age at death, again comparing 2004 with the period 1971-2003. This shows that in general the age of death was higher in 2004. For the period 1971-2003 the median age of death was 18 years (interquartile range 15-23 years), and for 2004 it was 30 (interquartile range 17-38 years).

[Figure 6](#) shows trends over time in the number of deaths by age group. This shows that the fall in deaths since 1990 was predominantly among young people. Among adults there was a levelling rather than a fall.

⁴ P <0.001 (Mann Whitney U test which includes all deaths)

SEX

[Table 2](#) shows the sex distribution of deaths associated with volatile substances. Deaths are far more common among males than females. Although over the past ten years the majority (81%) of deaths have been male, studies suggest that the practice of VSA is nearly equal between the sexes. A survey of secondary schoolchildren aged 11-15 in England in 2004, carried out for the Department of Health, found that 5% of boys and 6% of girls had sniffed volatile substances in the last year (see [Bibliography:16](#)). The European School Survey Project on Alcohol and other Drugs (ESPAD) 2003, found that in the majority of countries surveyed, including the United Kingdom, there were no gender differences in lifetime inhalant use among 16-year olds (see [Bibliography: 17](#)).

The proportion of female deaths rose between 1983 and 2003, attributable to a decline in the number of male deaths rather than an increase in the number of female deaths. However, the proportion of female deaths was lower in 2004 (19%) than in 2003 (28%). [Figure 7](#) shows the percentage of males and females among deaths in persons aged under 18, and in persons aged 18 years and over, for each year since 1983, the period over which data collection methods have been stable. For comparison, the mean percentages for 1983-2004 have also been included. Regression analysis showed that there was a significant rise in the proportion of females to males in the under-18s⁵ and in those aged 18 years and over⁶.

⁵ P=0.008 (P=0.03)

⁶ P<0.001 (P<0.001)

P values in brackets have been adjusted for serial autocorrelation.

To take into account possible changes in the population, Figures 8 and 9 show the mortality rates per million per year for the 10-14 and 15-19 age groups by sex. In both age groups, the mortality rates for females are generally lower than those for males. It should be noted that the scales used for Figures 8 and 9 are different.

Table 3 compares the numbers of VSA deaths at ages 10-19 years with those from all causes, those from transport accidents (TAs) and those from drug misuse (defined as deaths where the underlying cause is poisoning, drug abuse or drug dependence and where any of the substances controlled under the Misuse of Drugs Act (1971) are involved). In 2004 VSA accounted for 0.6% of all deaths at ages 10-14 years, and 1% of all deaths at ages 15-19 years. This compares with 16.6% and 30.3% of deaths associated with transport accidents (which are by far the most frequent cause of death in these age groups), and 0% and 3.7% of deaths associated with drug misuse.

Among those in the UK aged 10-14 years, the number of deaths associated with VSA was higher than the number associated with drug misuse for every single year from 2000 to 2004, (a total of 30 VSA deaths over the five years compared with 4 from drug misuse). At age 15, based on individual age data for England and Wales over the same period, the total number of deaths associated with VSA was higher than the total number associated with drug misuse (18 compared with 13) and at age 16 years, although the pattern was reversed (12 VSA deaths compared with 22 from drug misuse), VSA deaths were still important. In 2004 for the UK, among those aged 10-15 years there were eight deaths associated with VSA compared with three from drug misuse.

REGIONAL VARIATION

Table 4 shows the numbers of deaths by country and Government Office Regions.

Table 5 and Figure 10 give the Standardised Mortality Ratios (SMRs) for each region and country.

SMRs are used to compare the regions taking account of any differences in the age and sex distribution of the population. The SMR is the ratio of the number of deaths actually observed, to the number of deaths expected if the region were like the country as a whole. This is expressed as a percentage, so the whole country would have SMR = 100. Regions with an SMR greater than 100 have more deaths than would be expected if the country were uniform, and regions with an SMR of less than 100 have fewer deaths.

SMRs differed significantly across Government Office Regions⁷. For the period 1995–2004 the North East Region had the highest SMR (158), and London had the lowest SMR (68).

In general, there were more deaths than expected in the north of Great Britain and in Northern Ireland, and fewer deaths than expected in Wales and the south of England.

⁷ chi-squared =46.18, 11d.f., P<0.001

SUBSTANCES ABUSED

We classify separately butane intended for fuel use, and butane used as a propellant in aerosols. Almost all deaths were associated with only one volatile substance. In 6% of deaths, two or more volatile substances were known to be involved. [Table 6](#) and [Figure 11](#) show the number of times deaths were associated with each substance. [Figure 12](#) gives the same information for under-18 year olds. Cases where more than one substance was used appear more than once in this table and graph. The primary substance abused is shown in [Table 7](#).

Over the period 1995 to 2004 there was no significant change in the proportions of the substances abused⁸. [Table 7](#) shows that the absolute number of deaths associated with gas fuels in 2004 was lower at 33 than in any of the previous nine years. The overall decline in gas fuel related deaths over the ten-year period was statistically significant⁹. Similarly, the frequency of glue-related deaths declined over time¹⁰ (although this finding appeared to be due to a high number of deaths in 1995). There was no significant trend in aerosol-related deaths post 1994¹¹.

⁸ chi-squared=28.7, 27d.f., P=0.38, "fire extinguishers", "others" and "not known" combined

⁹ P=0.01 (P=0.01)

¹⁰ P=0.03 (P=0.02)

¹¹ P=0.21 (P=0.27)

P values in brackets have been adjusted for serial autocorrelation (Significance tests based on [Table 6](#))

PRODUCTS ABUSED

Within the broad substance categories a wide variety of products has been abused.

[Table 8](#) shows products abused by substance for 1971 to 2004. This also gives the type of products linked to deaths, showing them as percentages of substances used, rather than as percentages of the total number of deaths. Thus deaths can appear more than once in this table. Since 1971, butane gas lighter fuel has been associated with 83% of fatal abuses of gas fuel (38% of all substances fatally abused), deodorants and anti-perspirants with 45% of fatal abuses of aerosols (8% of all substances) and contact adhesives with 47% of fatal abuses of glue (7% of all substances).

[Table 9](#) gives the same information for 2004 alone. Butane gas lighter fuel was associated with 52% of all substances fatally abused, considerably more than the long-term average of 38% shown in [Table 8](#). In addition, butane fuel cans, some of which may have been lighter refills, accounted for another 6% of all substances (long term average of 1%).

[Table 10](#) shows deaths associated with cigarette lighter refills or disposable lighters for those aged under 18 years and 18 years and over. Among those aged under 18, there were eight deaths in 2004, compared with six in 2003. Legislation which banned the sale of these items to under-18 year olds came into effect in October 1999 (The Cigarette Lighter Refill (Safety) Regulations 1999). In this age group the average number of deaths associated with lighter fuel fell by 46% following the legislation, from 19.4 per year (1995-1999) to 10.4

per year (2000-2004). Although this fall was statistically significant¹², caution should be exercised when attempting to assess the impact of the legislation, since after falling in 2000, the number of deaths associated with lighter fuel in under-18 year olds returned to pre-legislative levels in 2001 and 2002.

Since 1995 there have been no deaths from text correction fluid, or pain relief sprays and only one death from a fire extinguisher (involving an old product). There have been two deaths involving nail varnish, one in 1994 and one in 1995, and two involving nail varnish remover (acetone), one in 1995 and one in 2003.

In 2004 there were three deaths associated with anaesthetic agents, of which two involved isoflurane supplied for veterinary purposes and one involved nitrous oxide from a non-medical source. These deaths were all in adults.

In recent years there has been an increase in the number of deaths resulting from the inhalation of helium. This has coincided with the publication of a book and information on the internet promoting helium for use in suicide. The cylinders of helium that can be used for this purpose are freely available from party balloon shops. With the assistance of ONS the number of such suicide deaths has now been ascertained as one in 1997, three in 2001, two in 2002, seven in 2003 and six in 2004. These deaths have not been included in the dataset because the inhalation of helium does not fit with our definition of VSA (see [page 3](#)).

¹² chi-squared (with continuity correction) =12.99,1 d.f., P<0.001

METHOD OF ADMINISTRATION

Methods of administration of volatile substances are shown in [Table 11](#), and [Table 12](#) gives this information by substance. The predominant method of abuse of butane lighter refills is believed to be by discharge directly into the mouth. In the absence of evidence to the contrary, lighter fuel abuse has been coded to this method. The most common method of abuse for aerosols has been by spraying through a cloth, and for glues has been by inhalation of the fumes or vapours from plastic bags.

MECHANISM OF DEATH

We give priority to indirect mechanisms of death; where the deceased has been found with a plastic bag over the head, inhalation of gastric contents, and trauma, which includes causes such as hanging and drowning. We only record a death as due to direct toxic effects if none of the above applies.

[Table 13](#) and [Figure 13](#) show the numbers of deaths due to each mechanism.

Some inconsistencies in the way this variable was previously coded have now been removed, resulting in a change to the data. The majority of deaths (60% overall and 72% in 2004) are due to direct toxic effects. The proportion of trauma deaths, which were more common with the abuse of glue, has decreased significantly¹³, from an average of 11% (1995-99) to an average of 5% (2000-04). The proportion of deaths involving the use of a plastic bag over the head (11% overall) has changed little over time.

¹³ Chi-squared with Yates' correction = 5.09, d.f.=1, P=0.02

PREVIOUS HISTORY OF SOLVENT ABUSE

In 2004, for 36 of the VSA deaths (77%), there was evidence of a previous history of solvent abuse. For the remaining 23%, there was no evidence of a previous volatile substance abuse, or the history was unknown. However, an absence of evidence should not lead to the assumption that death occurred on the first occasion, as this fact is often difficult to establish.

PLACE OF DEATH AND FATAL ABUSE

Figure 14 shows the place of death. For 2004, 59% of deaths occurred at home or the home of a friend, and 36% of deaths were recorded as having occurred in hospital, or as “dead on arrival” at hospital.

Figure 15 shows where the fatal abuse took place. In 2004 the most common place for abuse remained the abuser's home (77%), with a further 6% of abuses in the home of a friend. In 17% of the deaths the substance was abused in a public place such as a park, shopping centre or the street.

Figure 16 shows the place of abuse by sex for the period 1995 – 2004. There was no significant difference between the sexes in the place of abuse¹⁴.

Figure 17 shows the place where the substance was abused for each year from 1995 to 2004. Year to year variation in the proportion of those fatally abusing at either their home, or the home of a friend, was not statistically significant¹⁵, although

¹⁴ chi-squared= 3.87, 3 d.f., P=0.28, combining “workplace”, “school/institution” and “other” and excluding “unknowns”.

¹⁵ chi-squared=15.47, 9 d.f., P=0.08

there was strong evidence of an increasing trend in this proportion over time¹⁶.

The relationship between age and place of abuse is shown in [Table 14](#). Looking at the last ten years, the most common place of fatal abuse was the person's home or the home of a friend, especially for those aged 18 and over.

SUICIDES

Information on deaths associated with VSA since 1983 where there was a verdict of suicide, is again provided in this report. [Table 15](#) gives the frequency and median age at death by year, and [Figure 18](#) shows the age and sex distribution. To put into perspective the number of suicides associated with VSA since 1983 (78 in total), it is worth mentioning that in England and Wales during the same period, the total number of suicides recorded by ONS was just over 122,000.

For the suicides associated with VSA, the median age increased significantly over the period 1983 to 2004¹⁷. In the same period, the male/female ratio was 10:1 for VSA suicides compared with a ratio of 3:1 for all suicides¹⁸. For all VSA deaths since 1983, the male/female ratio was 6:1, but the difference in the sex ratio between the suicides and other VSA deaths was not statistically significant¹⁹.

¹⁶ $P=0.007$ ($P=0.001$), P values in brackets have been adjusted for serial autocorrelation.

¹⁷ Kendall's tau-b=0.48, $P=0.002$

¹⁸ Death rates from suicide: by gender and age 1974-2000: Social trends 32. Suicide rates: by sex and age: Social Trends 34, National Statistics.

¹⁹ Fisher's exact test: $P=0.16$

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STATISTICAL METHODS listed by footnote number

Statistical modelling was performed using STATA v 8 and 9 (StatCorp LP, 4905 Lakeway Drive, College Station, TX-77845, USA, 2005 : www.stata.com).

Footnote

3. Orthogonal polynomial Poisson regression was used to test for trend in $\log(\text{yearly totals})$.

- 5-6. P values in brackets have been adjusted for serial autocorrelation in the residuals up to and including lag 2 using the Newey-West variance estimator.

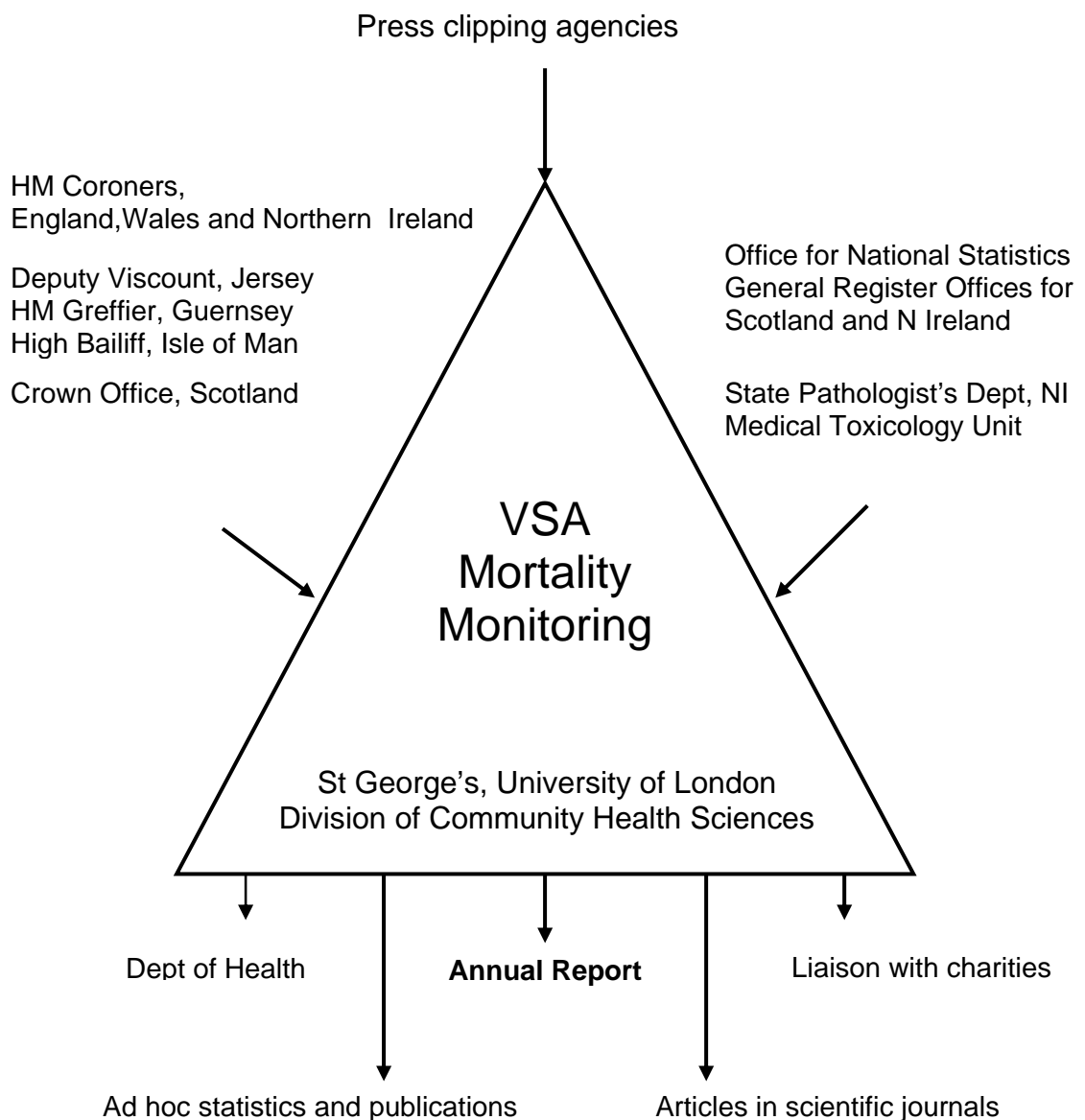
- 9-11 Ordinary least squares regression was used to test for linear trend in the square root of yearly totals. P values in brackets have been adjusted for serial autocorrelation in the residuals up to and including lag 2 using the Newey-West variance estimator.

- 15 Ordinary least squares regression was used to test for linear trend in proportions. P value in brackets has been adjusted for serial autocorrelation in the residuals up to and including lag 2 using the Newey-West variance estimator.

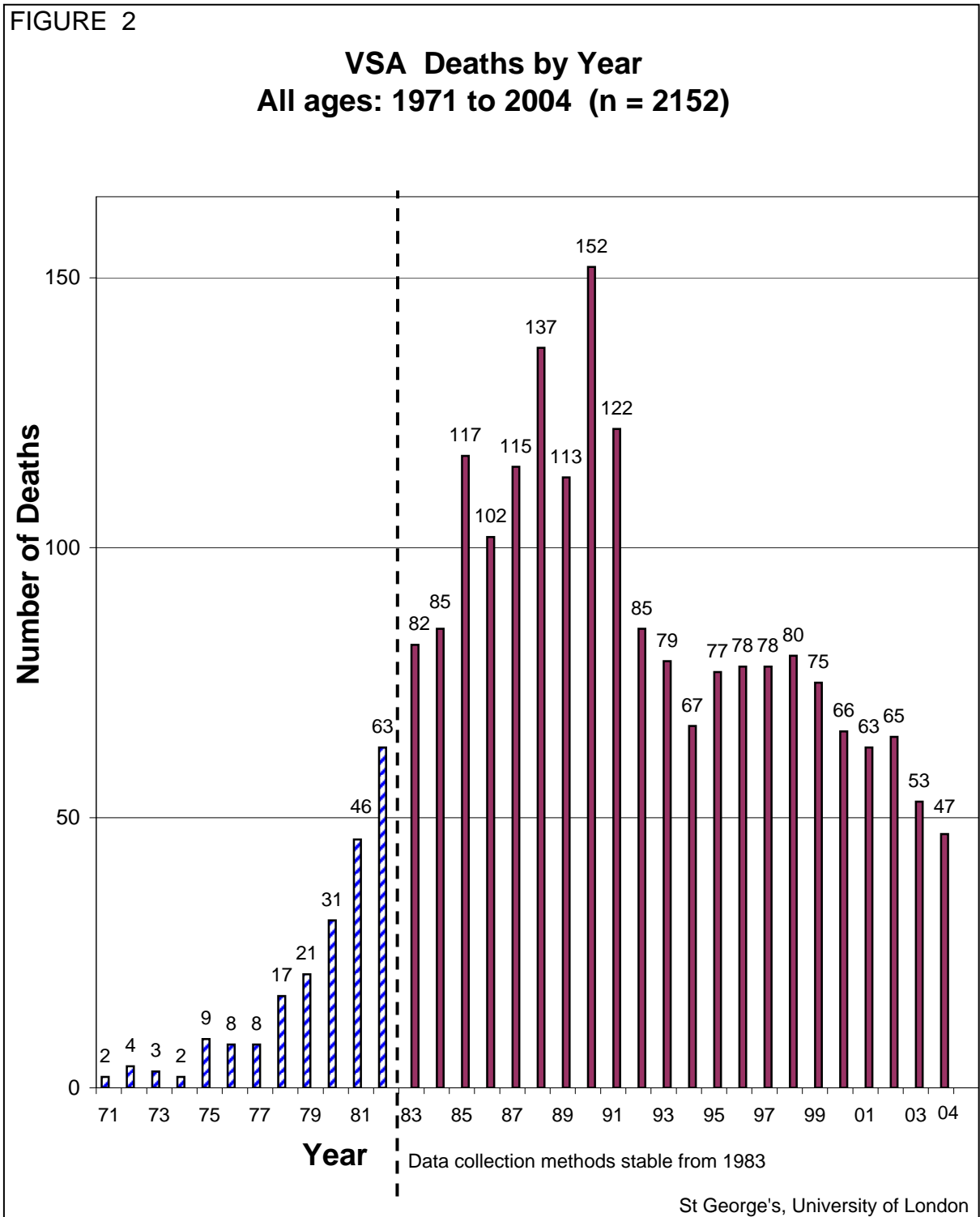
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FIGURE 1

Volatile Substance Abuse Deaths
Collection and Dissemination of Data



St George's, University of London

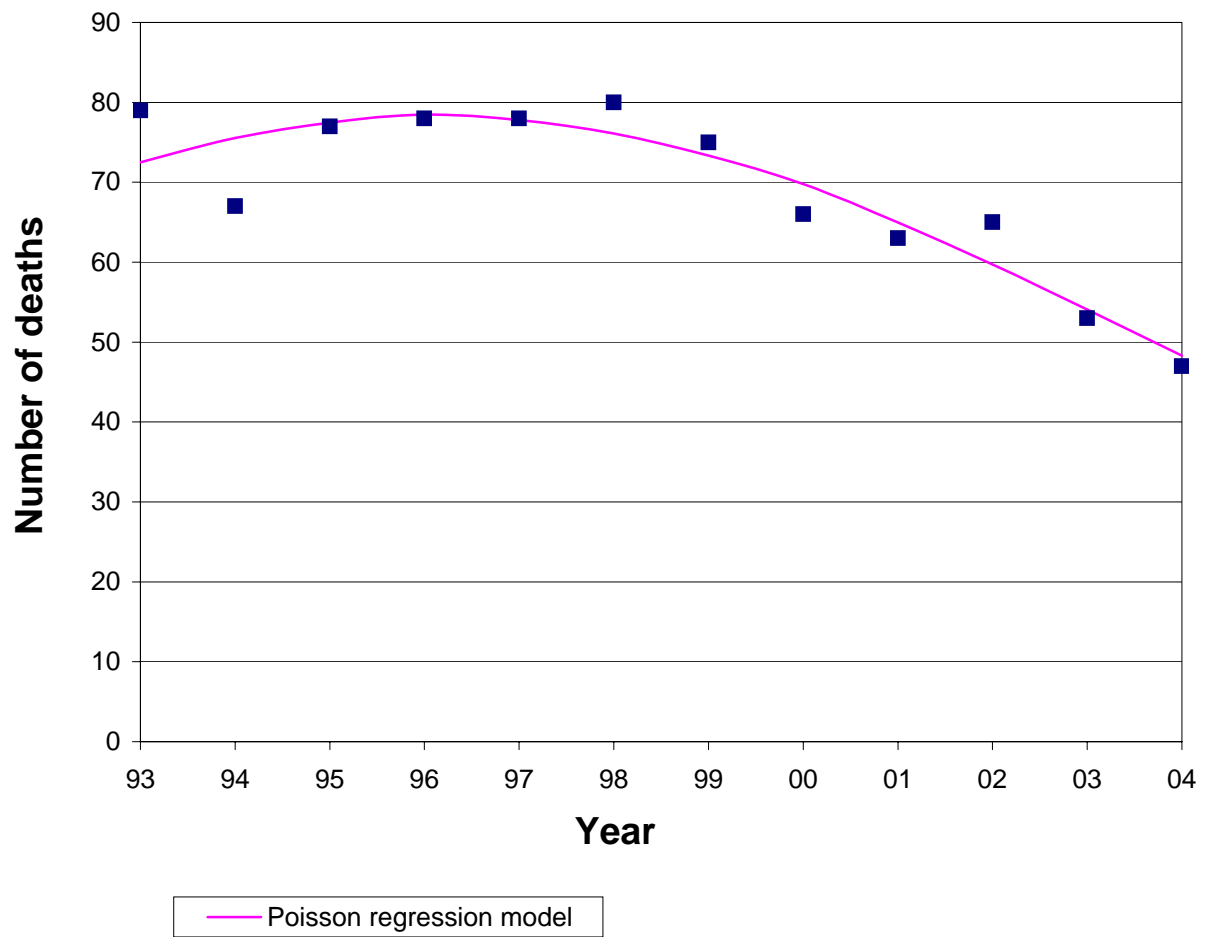


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FIGURE 3

**VSA Deaths by Year
All Ages: 1993 - 2004**



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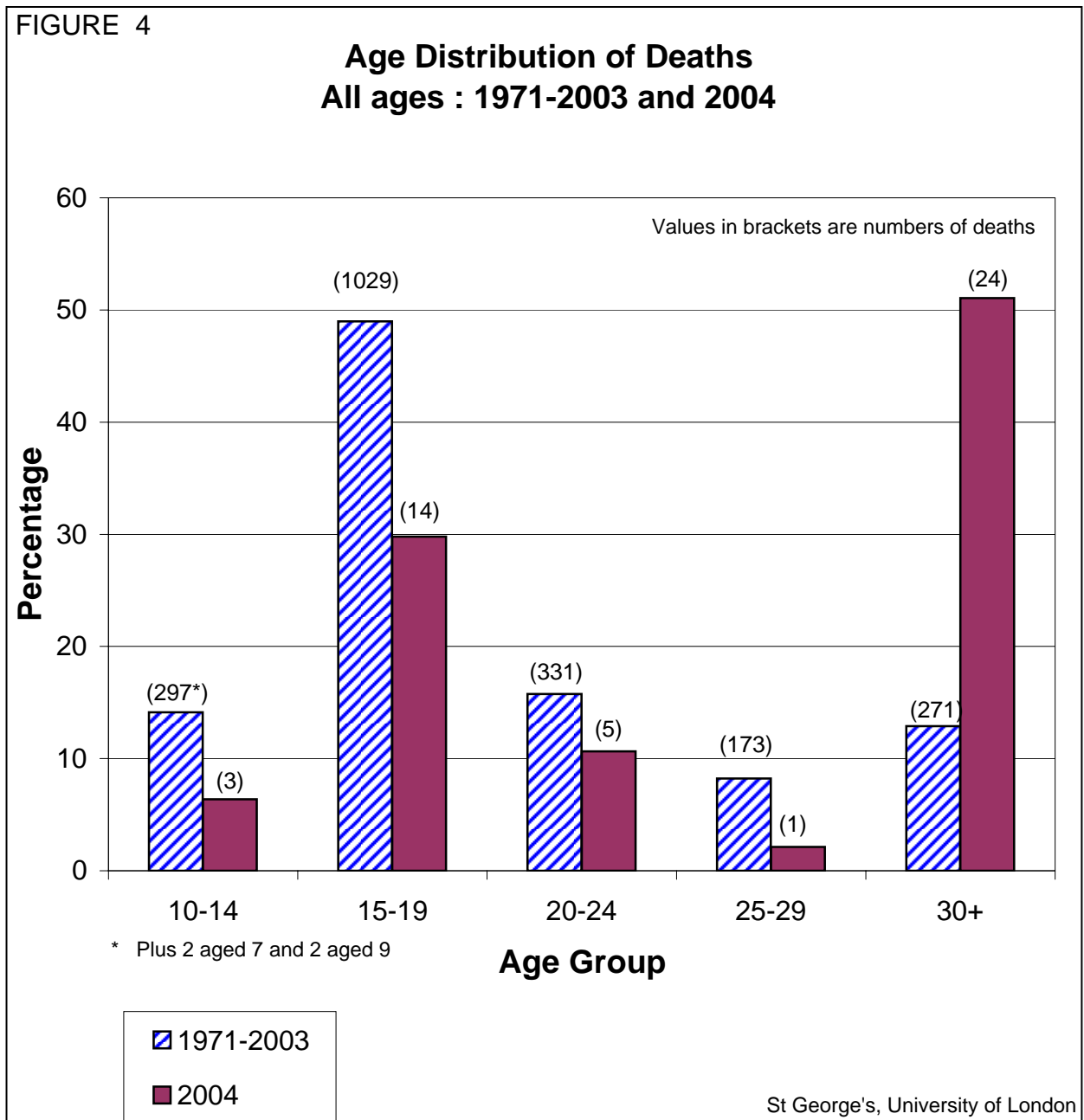
TABLE 1

Age Distribution of Deaths 1971-2002, 2003 and 2004

AGE	1971-2002		2003		2004		TOTAL	CUMULATIVE	
	No.	%	No.	%	No.	%	No.	No.	%
7	1	0.0	1	1.9	0	0.0	2	2	0.1
9	2	0.1	0	0.0	0	0.0	2	4	0.2
10	4	0.2	0	0.0	0	0.0	4	8	0.4
11	8	0.4	0	0.0	0	0.0	8	16	0.7
12	30	1.5	1	1.9	1	2.1	32	48	2.2
13	70	3.4	0	0.0	2	4.3	72	120	5.6
14	182	8.9	2	3.8	0	0.0	184	304	14.1
15	269	13.1	0	0.0	5	10.6	274	578	26.9
16	267	13.0	2	3.8	3	6.4	272	850	39.5
17	209	10.2	3	5.7	2	4.3	214	1064	49.4
18	167	8.1	0	0.0	2	4.3	169	1233	57.3
19	109	5.3	3	5.7	2	4.3	114	1347	62.6
20-24	318	15.5	13	24.5	5	10.6	336	1683	78.2
25-34	251	12.2	17	32.1	8	17.0	276	1959	91.0
35-44	82	4.0	8	15.1	11	23.4	101	2060	95.7
45-54	46	2.2	3	5.7	4	8.5	53	2113	98.2
55-64	26	1.3	0	0.0	1	2.1	27	2140	99.4
65-74	8	0.4	0	0.0	1	2.1	9	2149	99.9
75 & over	3	0.1	0	0.0	0	0.0	3	2152	100.0
TOTAL	2052	100.0	53	100.0	47	100.0	2152		

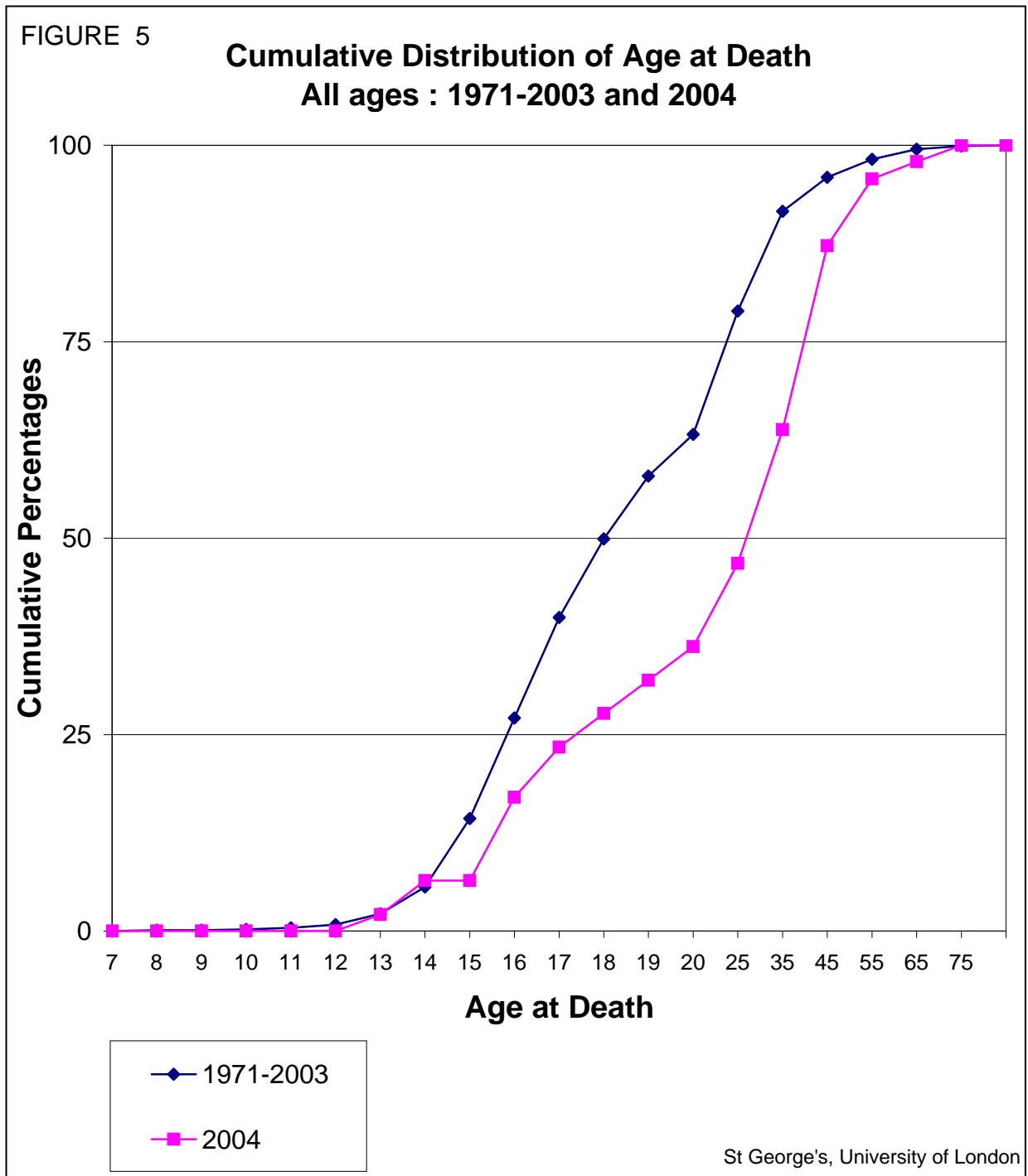
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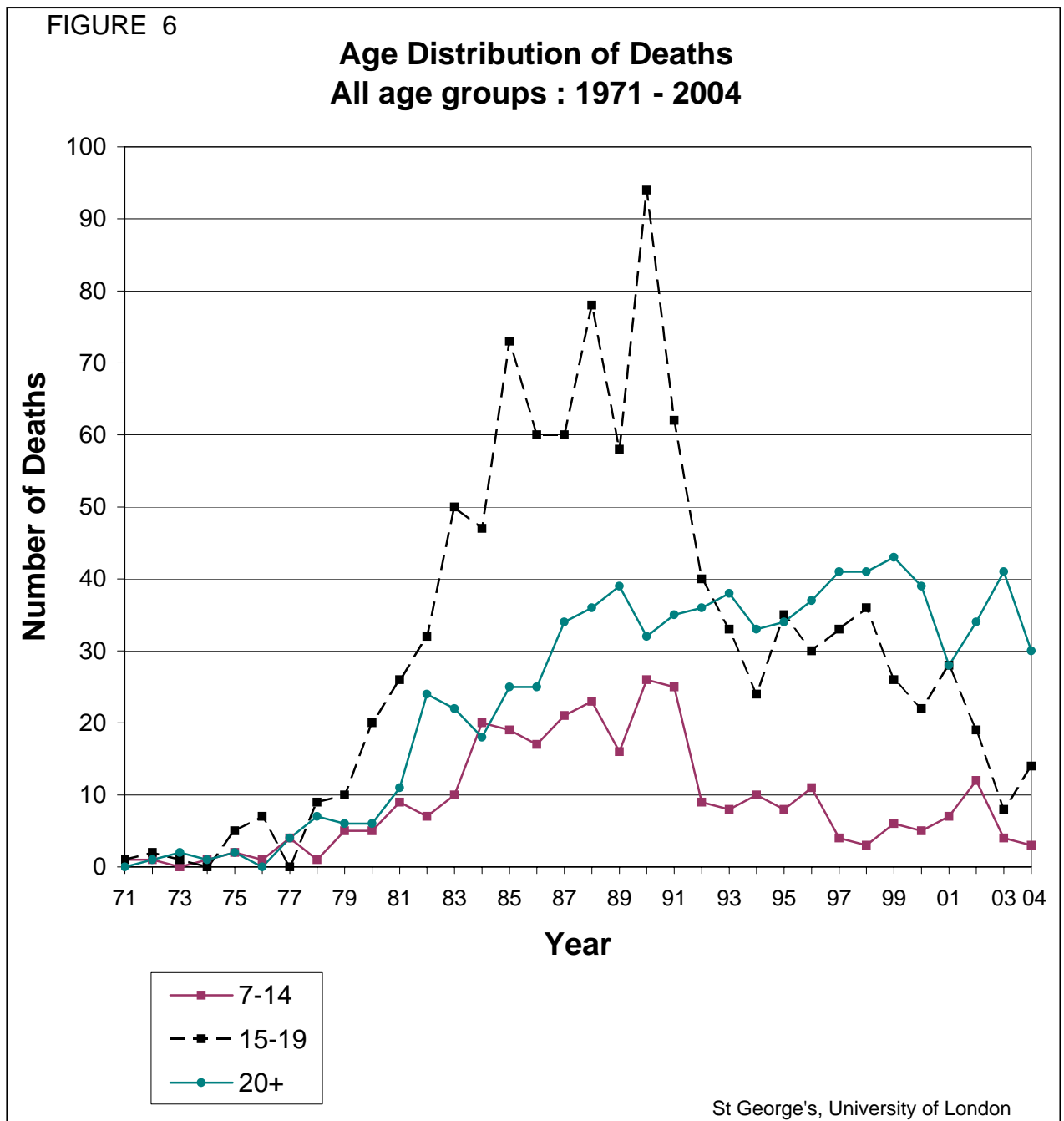
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TABLE 2

**Sex Distribution of Deaths
1971- 1994 and each year to 2004**

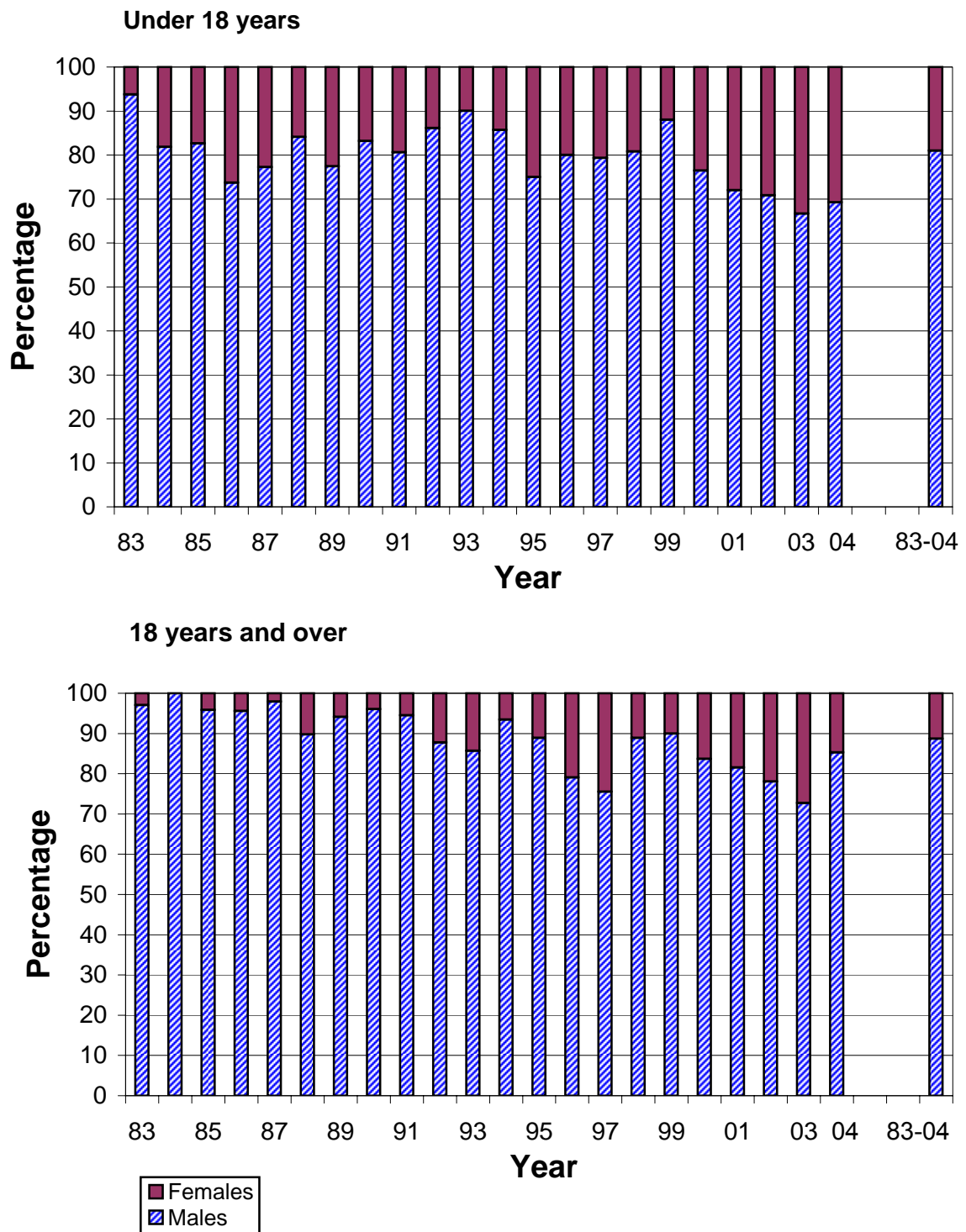
SEX	YEAR											TOTAL
	71-94	95	96	97	98	99	00	01	02	03	04	
Male	1295	64	62	60	69	67	54	49	49	38	38	1845
%	88.1	83.1	79.5	76.9	86.3	89.3	81.8	77.8	75.4	71.7	80.9	85.7
Female	175	13	16	18	11	8	12	14	16	15	9	307
%	11.9	16.9	20.5	23.1	13.8	10.7	18.2	22.2	24.6	28.3	19.1	14.3
TOTAL	1470	77	78	78	80	75	66	63	65	53	47	2152

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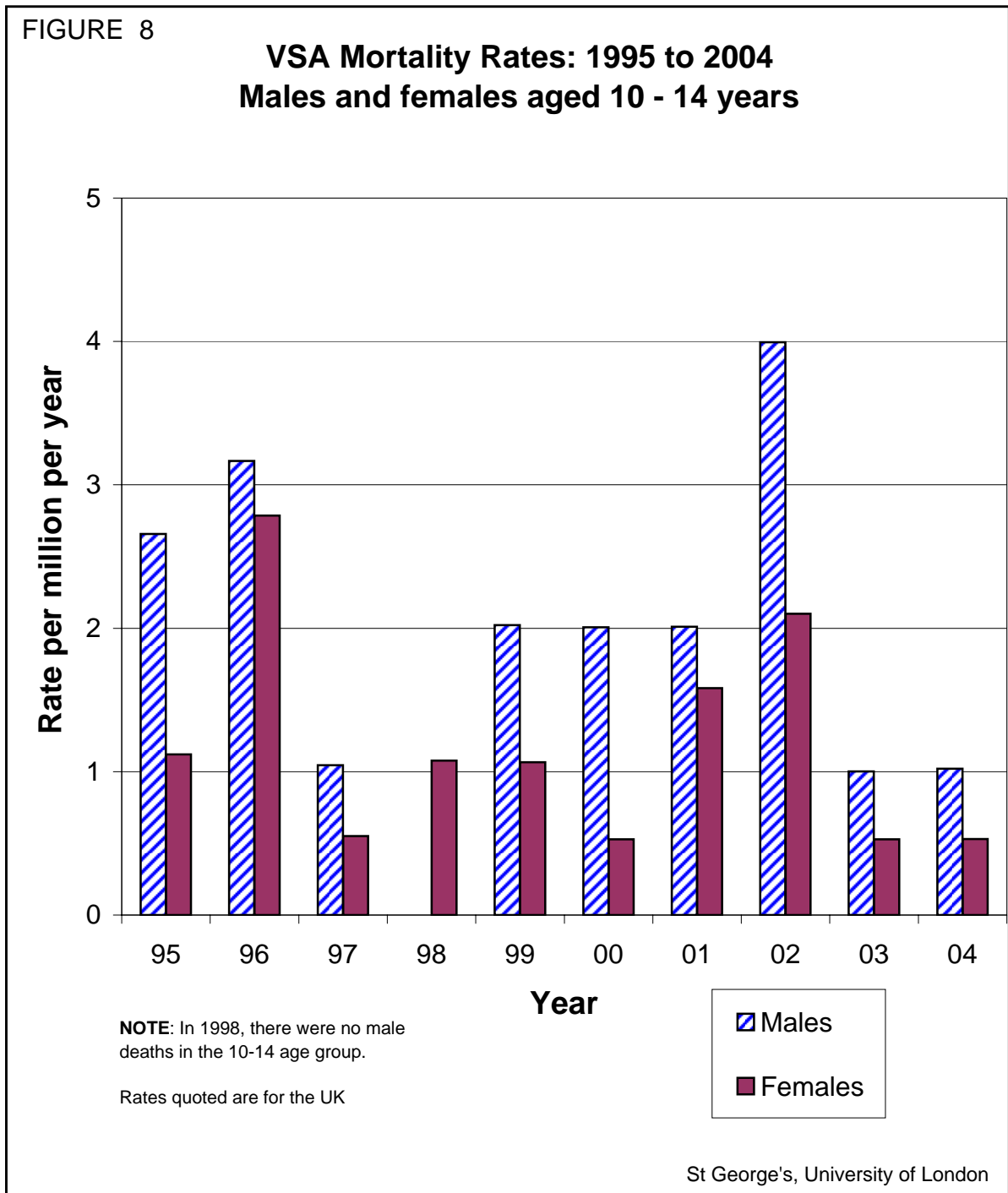
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FIGURE 7

Sex Distribution of Deaths 1983 - 2004

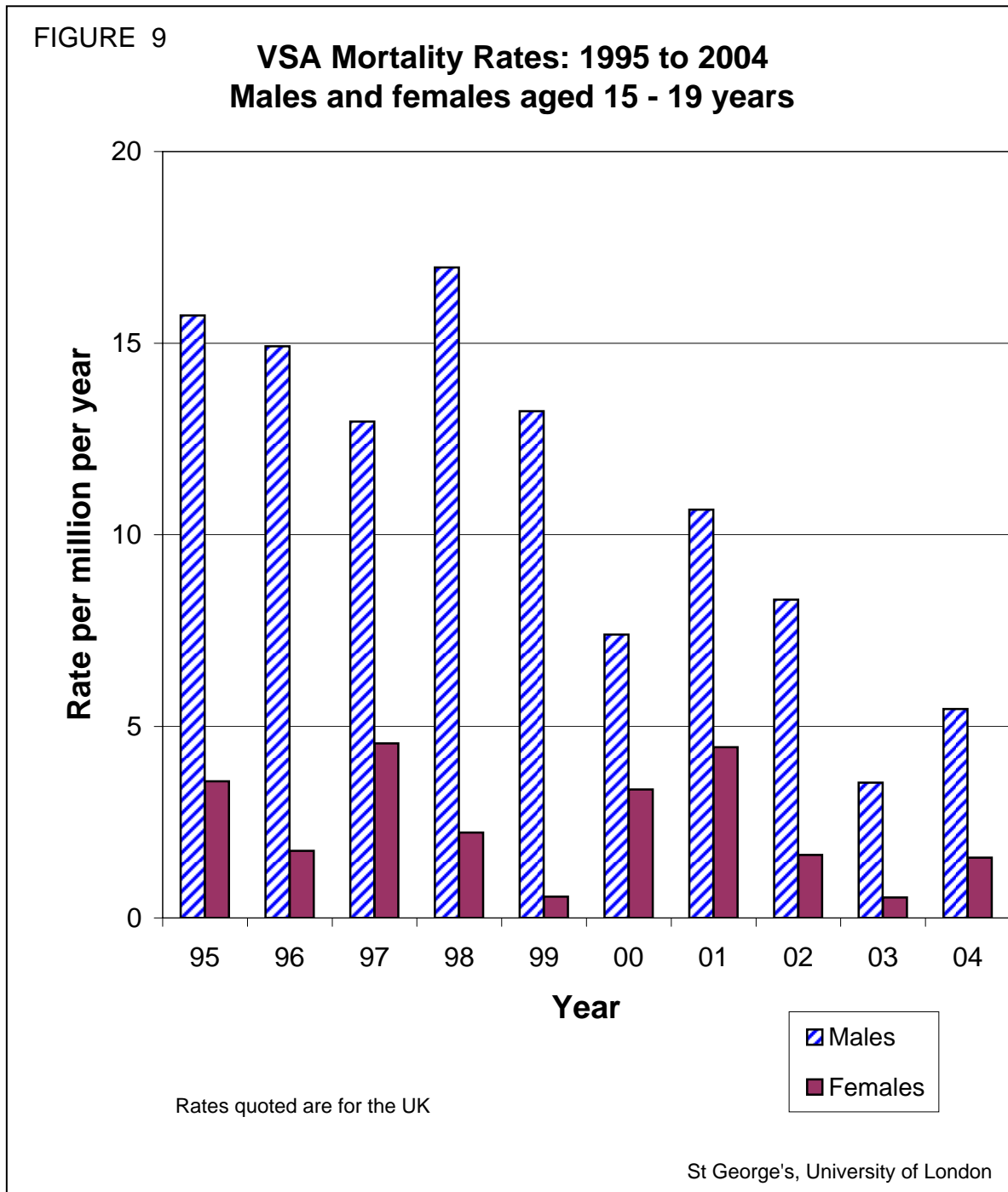


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TABLE 3

Numbers of Deaths in UK* in 2004
Age Groups 10-14 and 15-19 years
All Causes, Transport Accidents, Drug Misuse and VSA

CAUSE OF DEATH	Ages 10-14		Ages 15-19	
	No.	% of all cause deaths	No.	% of all cause deaths
All causes				
Male	286	60.0	917	67.3
Female	191	40.0	445	32.7
TOTAL	477	100.0	1362	100.0
Transport Accidents				
Male	58	20.3	312	34.0
Female	21	11.0	101	22.7
TOTAL	79	16.6	413	30.3
Drug misuse-related				
TOTAL	0	0	51	3.7
Volatile Substance Abuse				
Male	2	0.7	11	1.2
Female	1	0.5	3	0.7
TOTAL	3	0.6	14	1.0

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*Deaths in Channel Islands and Isle of Man excluded

Sources of data for deaths from all causes, from transport accidents and from drug misuse:

England and Wales:	Office for National Statistics
Scotland:	General Register Office for Scotland
Northern Ireland:	General Register Office for Northern Ireland

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TABLE 4

**Number of VSA Deaths in Each Government Office Region
and Country: 1971-1994 and each year to 2004**

REGION or COUNTRY	YEAR											TOTAL
	71-94	95	96	97	98	99	00	01	02	03	04	
ENGLAND:												
North East	90	4	5	6	7	7	3	3	6	4	1	136
North West	192	7	9	14	16	6	10	4	4	5	6	273
Yorkshire/Humber	137	5	11	11	4	5	5	10	7	3	6	204
East Midlands	85	10	5	5	10	6	5	9	5	3	7	150
West Midlands	133	9	3	5	6	7	7	5	10	5	3	193
East	92	1	4	11	5	4	7	5	2	4	4	139
London	188	8	6	7	6	7	4	6	2	8	6	248
South East	148	12	9	4	7	4	7	4	10	8	5	218
South West	82	6	5	5	3	8	4	3	5	1	3	125
TOTAL ENGLAND	1147	62	57	68	64	54	52	49	51	41	41	1686
WALES	61	3	3	1	3	7	1	1	5	1	4	90
SCOTLAND	205	9	13	5	10	8	9	9	8	6	1	283
N.IRELAND	54	1	3	3	3	6	2	4	1	5	1	83
CHANNEL ISLANDS	3	2	1	0	0	0	1	0	0	0	0	7
ISLE OF MAN	0	0	1	1	0	0	1	0	0	0	0	3
TOTAL UK	1470	77	78	78	80	75	66	63	65	53	47	2152

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TABLE 5

**Standardised Mortality Ratios
for Each Government Office Region and Country: 1995-2004
adjusted for age and sex**

REGION or COUNTRY	Deaths		SMR	95% confidence interval
	Observed	Expected		
ENGLAND:				
North East	46	29.2	158	116 to 210
North West	81	77.3	105	83 to 130
Yorkshire & the Humber	67	57.0	118	91 to 149
East Midlands	65	47.6	137	105 to 174
West Midlands	60	60.7	99	75 to 127
East	47	59.5	79	58 to 105
London	60	88.5	68	52 to 87
South East	70	90.0	78	61 to 98
South West	43	53.2	81	58 to 109
TOTAL ENGLAND	539	563	96	88 to 104
WALES	29	32.5	89	60 to 128
SCOTLAND	78	58.1	134	106 to 168
NORTHERN IRELAND	29	21.4	136	91 to 195
WHOLE OF UK*	675	675	100	

Crude Mortality Rates per million population per year	Males	Females	Both
	1.9	0.43	1.15

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*Channel Isles and Isle of Man are not included

Sources of population data (Average of census updated mid-year estimates for 1999 and 2000):

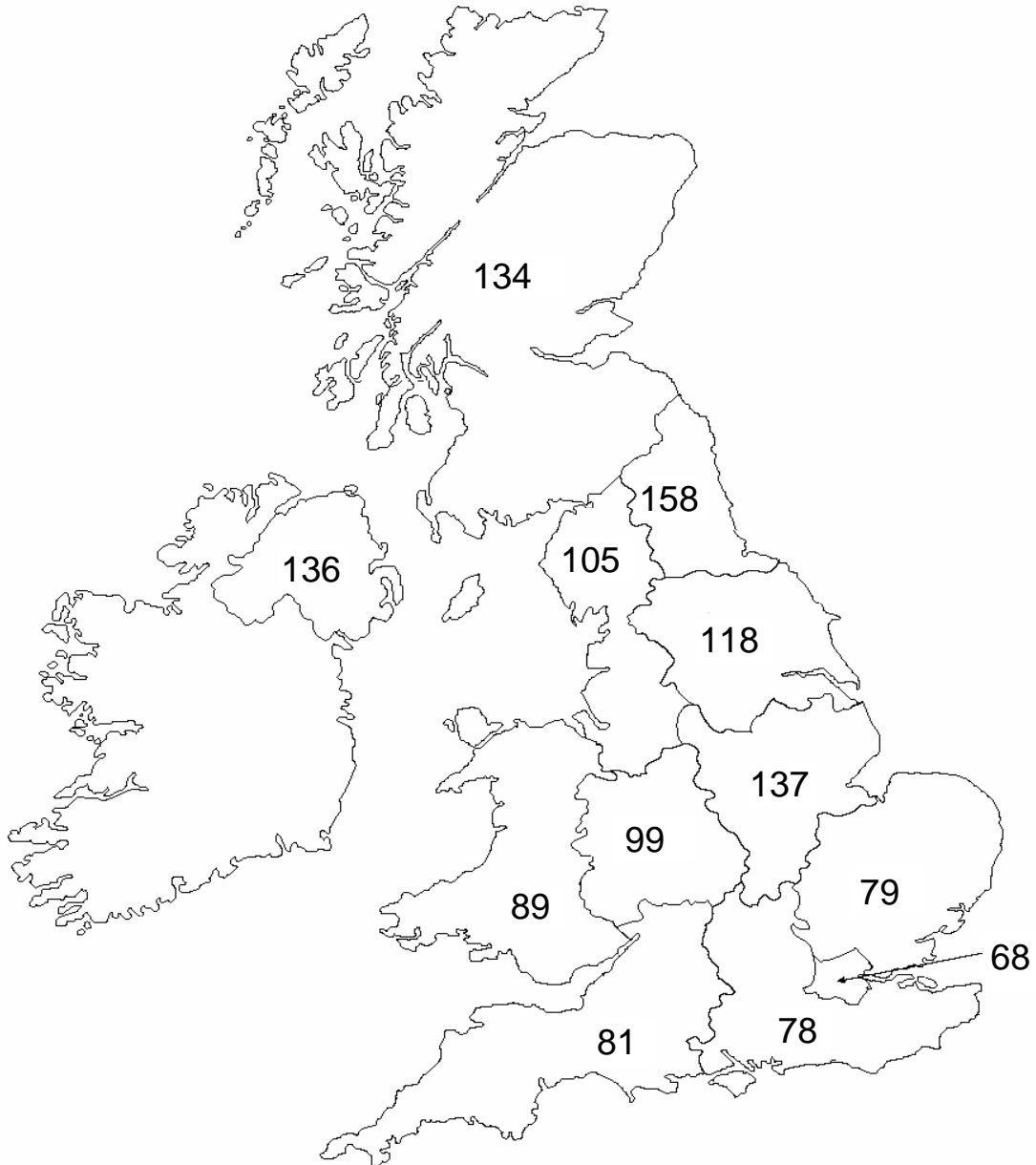
England and Wales:	Office for National Statistics
Scotland:	General Register Office for Scotland
Northern Ireland:	General Register Office for Northern Ireland

Note: Expected deaths may not add up exactly due to rounding

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FIGURE 10

**Standardised Mortality Ratios
Government Office Regions
All ages: 1995 - 2004**



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TABLE 6

**Substances Abused
1971-1994 and each year to 2004
(n=2258)**

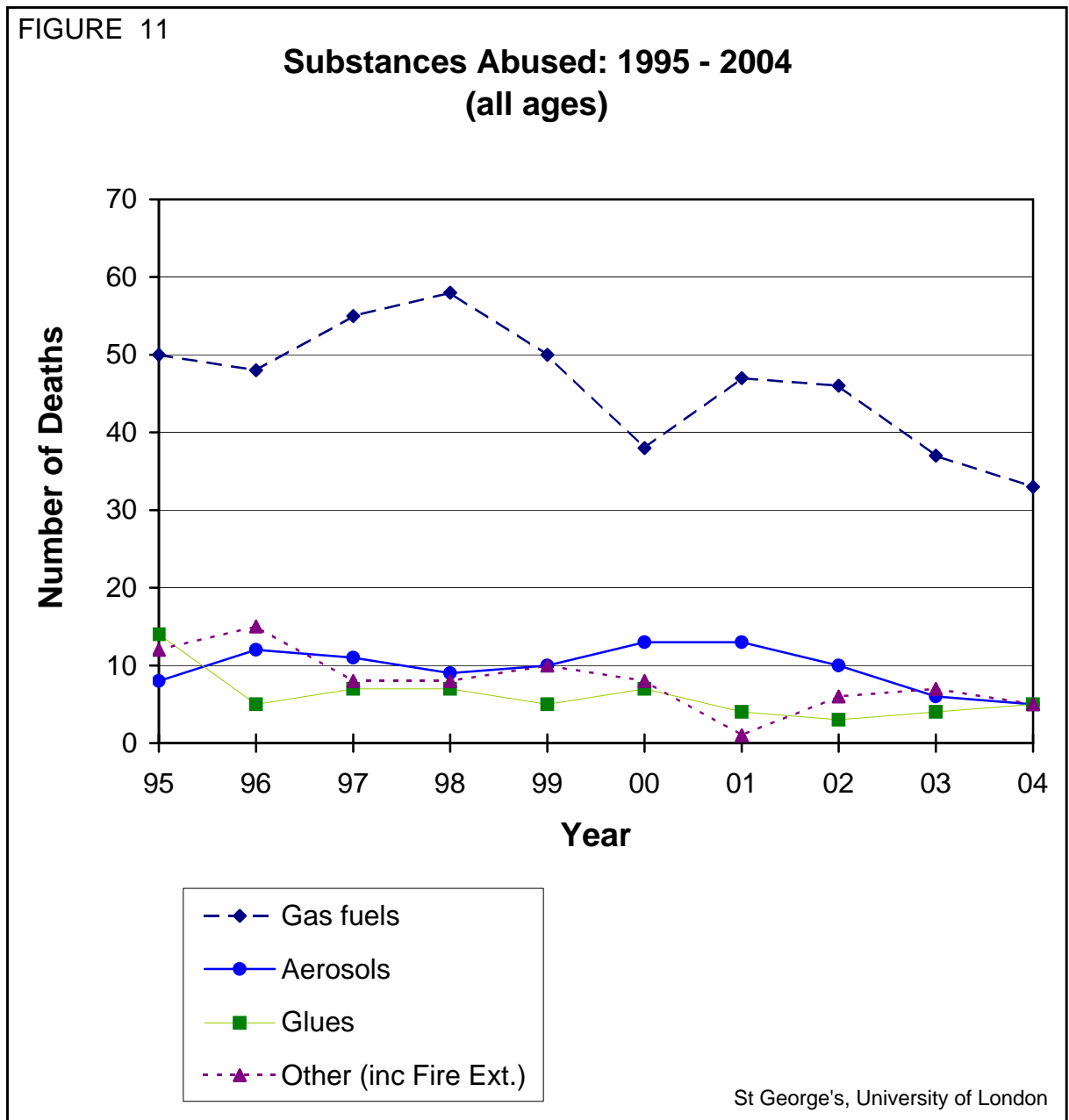
SUBSTANCE		71-94	95	96	97	98	99	00	01	02	03	04	TOTAL
GAS FUELS	No.	584	50	48	55	58	50	38	47	46	37	33	1046
	%	36.2	59.5	60.0	67.9	69.9	66.7	56.7	72.3	70.8	68.5	68.8	46.3
AEROSOLS	No.	304	8	12	11	9	10	13	13	10	6	5	401
	%	20.3	9.5	15.0	13.6	10.8	13.3	19.4	20.0	15.4	11.1	10.4	17.8
GLUES	No.	289	14	5	7	7	5	7	4	3	4	5	350
	%	18.8	16.7	6.3	8.6	8.4	6.7	10.4	6.2	4.6	7.4	10.4	15.5
FIRE EXTINGUISHER	No.	56	1	0	0	0	1	0	0	0	0	0	58
	%	3.8	1.2	0.0	0.0	0.0	1.3	0.0	0.0	0.0	0.0	0.0	2.6
OTHER	No.	312	11	15	8	8	9	8	1	6	7	5	390
	%	20.3	13.1	18.8	9.9	9.6	12.0	11.9	1.5	9.2	13.0	10.4	17.3
NOT KNOWN	No.	11	0	0	0	1	0	1	0	0	0	0	13
	%	0.7	0.0	0.0	0.0	1.2	0.0	1.5	0.0	0.0	0.0	0.0	0.6
TOTAL	No.	1556	84	80	81	83	75	67	65	65	54	48	2258
	%	100	100	100	100	100	100	100	100	100	100	100	100

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Note: All substances associated with a death are included in this table, so numbers of substances are greater than numbers of deaths.

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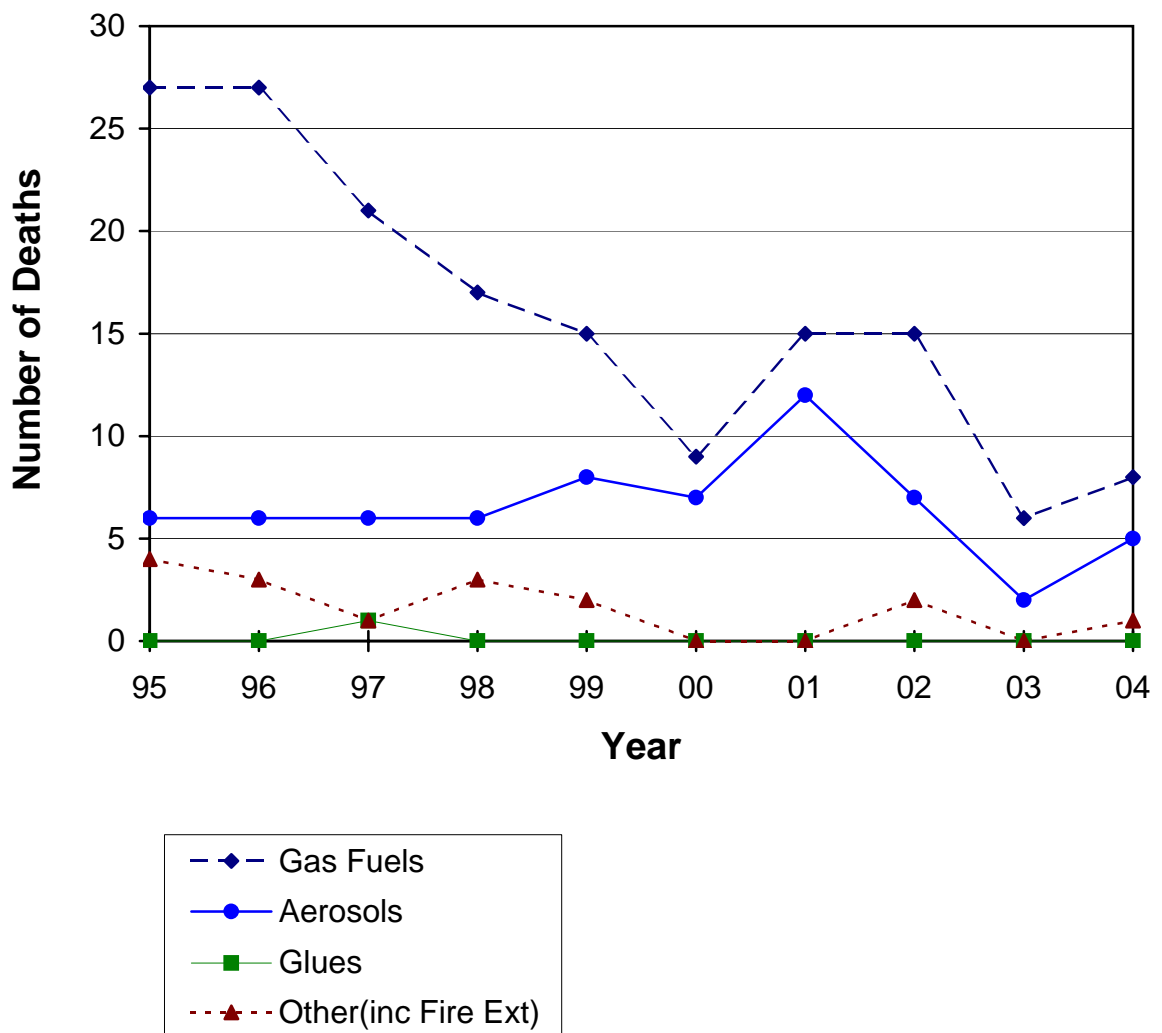


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FIGURE 12

**Substances Abused: 1995 - 2004
under 18 year olds**



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TABLE 7

**Primary Substances Abused by Year
1995 to 2004**

SUBSTANCE	YEAR										TOTAL	
	95	96	97	98	99	00	01	02	03	04		
GAS FUELS	No.	49	48	55	57	50	38	46	46	37	33	459
	%	63.6	61.5	70.5	71.3	66.7	57.6	73.0	70.8	69.8	70.2	67.3
AEROSOLS	No.	5	11	9	8	10	13	12	10	5	4	87
	%	6.5	14.1	11.5	10.0	13.3	19.7	19.0	15.4	9.4	8.5	12.8
GLUES	No.	14	5	6	7	5	6	4	3	4	5	59
	%	18.2	6.4	7.7	8.8	6.7	9.1	6.3	4.6	7.5	10.6	8.7
FIRE EXTINGUISHER	No.	1	0	0	0	1	0	0	0	0	0	2
	%	1.3	0.0	0.0	0.0	1.3	0.0	0.0	0.0	0.0	0.0	0.3
OTHER	No.	8	14	8	7	9	8	1	6	7	5	73
	%	10.4	17.9	10.3	8.8	12.0	12.1	1.6	9.2	13.2	10.6	10.7
NOT KNOWN	No.	0	0	0	1	0	1	0	0	0	0	2
	%	0.0	0.0	0.0	1.3	0.0	1.5	0.0	0.0	0.0	0.0	0.3
TOTAL	No.	77	78	78	80	75	66	63	65	53	47	682
	%	100	100	100	100	100	100	100	100	100	100	100

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TABLE 8**Product Abused by Substance: 1971 - 2004****n = 2258**

PRODUCT	No.	% of Substance Group	% of all Substances
GAS FUELS			
Lighter fuel	863	82.5	38.2
Butane gas cans	29	2.8	1.3
Domestic gas (bottled)	103	9.8	4.6
Propane gas cylinder	25	2.4	1.1
Acetylene	3	0.3	0.1
Unspecified butane	23	2.2	1.0
TOTAL for GAS FUELS	1046	100.0	46.3
AEROSOLS			
Deodorant / Antiperspirant	180	44.9	8.0
Pain relief spray	63	15.7	2.8
Air freshener	51	12.7	2.3
Hair spray	29	7.2	1.3
Cleaning fluids	17	4.2	0.8
Insect spray	7	1.7	0.3
Paint spray	8	2.0	0.4
Aerosol glue	2	0.5	0.1
Other aerosols	44	11.0	1.9
TOTAL for AEROSOLS	401	100.0	17.8
GLUES			
Contact adhesives	166	47.4	7.4
Bicycle tyre repair glue	10	2.9	0.4
Model glue	3	0.9	0.1
Other glues	171	48.9	7.6
TOTAL for GLUES	350	100.0	15.5
OTHER			
Typewriter correction fluid	113	29.0	5.0
Chloroform	32	8.2	1.4
Dry cleaning fluids	21	5.4	0.9
Petrol	34	8.7	1.5
Plaster remover	17	4.4	0.8
Domestic cleaning fluids	16	4.1	0.7
Industrial solvents / degreasers	18	4.6	0.8
Anaesthetic agents	35	9.0	1.6
Carbon tetrachloride	11	2.8	0.5
Paint thinners and strippers	16	4.1	0.7
Alkyl nitrites	11	2.8	0.5
Refrigerant gases	5	1.3	0.2
Brake cleaner	3	0.8	0.1
Ether	5	1.3	0.2
Benzene	1	0.3	0.0
Petroleum spirits (excl. petrol)	1	0.3	0.0
Miscellaneous products	51	13.1	2.3
TOTAL for OTHER	390	100.0	17.3
Fire Extinguishers	58	100.0	2.6
Substance not known	13	100.0	0.6

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TABLE 9

Product Abused by Substance: 2004
n = 48

PRODUCT	No.	% of Substance Group	% of all Substances
GAS FUELS			
Lighter fuel	25	75.8	52.1
Butane gas cans	3	9.1	6.3
Propane gas cylinder	4	12.1	8.3
Unspecified butane	1	3.0	2.1
TOTAL for GAS FUELS	33	100.0	68.8
AEROSOLS			
Deodorant / Antiperspirant	3	60.0	6.3
Air freshener	2	40.0	4.2
TOTAL for AEROSOLS	5	100.0	10.4
GLUES			
Contact adhesives	1	20.0	2.1
Unspecified glues	4	80.0	8.3
TOTAL for GLUES	5	100.0	10.4
OTHER			
Alkyl Nitrite	1	20.0	2.1
Anaesthetic agents:			
Isoflurane	2	40.0	4.2
Nitrous Oxide	1	20.0	2.1
Petrol	1	20.0	2.1
TOTAL for OTHER	5	100.0	10.4
Substance not known	0	0.0	0.0

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TABLE 10

**Deaths Associated with Cigarette Lighter Refills
1971-1994 and each year to 2004
(n = 861)**

Under 18 years

Age/Sex	Year											TOTAL
	71-94	95	96	97	98	99	00	01	02	03	04	
Male	253	16	20	15	13	15	7	12	13	4	6	374
Female	41	5	4	6	3	0	1	3	2	2	2	69
Total	294	21	24	21	16	15	8	15	15	6	8	443
%	35.5	65.6	68.6	72.4	61.5	60.0	47.1	60.0	62.5	66.7	61.5	41.6
All VSA Deaths	829	32	35	29	26	25	17	25	24	9	13	1064

The Cigarette Lighter Refill (Safety) Regulations came into effect in October 1999

18 years and over

Age/Sex	Year											TOTAL
	71-94	95	96	97	98	99	00	01	02	03	04	
Male	168	16	13	19	23	25	20	20	16	17	14	351
Female	17	3	5	7	4	3	6	7	6	6	3	67
Total	185	19	18	26	27	28	26	27	22	23	17	418
%	28.9	42.2	41.9	53.1	50.0	56.0	53.1	71.1	53.7	52.3	50.0	38.4
All VSA Deaths	641	45	43	49	54	50	49	38	41	44	34	1088

All Ages

Age/Sex	Year											TOTAL
	71-94	95	96	97	98	99	00	01	02	03	04	
Male	421	32	33	34	36	40	27	32	29	21	20	725
Female	58	8	9	13	7	3	7	10	8	8	5	136
Total	479	40	42	47	43	43	34	42	37	29	25	861
%	32.6	51.9	53.8	60.3	53.8	57.3	51.5	66.7	56.9	54.7	53.2	40.0
All VSA Deaths	1470	77	78	78	80	75	66	63	65	53	47	2152

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TABLE 11

**Methods of Administration of Volatile Substances
1971- 2002, 2003 and 2004**

METHOD	1971- 2002		2003		2004		TOTAL	
	No.	%	No.	%	No.	%	No.	%
Directly into mouth	631	30.8	34	64.2	25	53.2	690	32.1
Sniffed from container	135	6.6	6	11.3	4	8.5	145	6.7
Sniffed from cloth or sleeve	205	10.0	4	7.5	2	4.3	211	9.8
Sniffed from plastic bag	293	14.3	1	1.9	2	4.3	296	13.8
Plastic bag over head	233	11.4	5	9.4	10	21.3	248	11.5
Mask or padding over face	52	2.5	1	1.9	3	6.4	56	2.6
Other	24	1.2	0	0.0	0	0.0	24	1.1
Not known	479	23.3	2	3.8	1	2.1	482	22.4
TOTAL	2052	100.0	53	100.0	47	100.0	2152	100.0

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TABLE 12

**Methods of Administering Volatile Substances by Substance
1971- 2002, 2003 and 2004**

METHOD	1971- 2002		2003		2004		TOTAL	
	No.	%	No.	%	No.	%	No.	%
GAS FUELS								
Directly into mouth	557	58.0	33	89.2	25	75.8	615	59.7
Sniffed from container	30	3.1	0	2.0	0	0.0	30	2.9
Sniffed from cloth or sleeve	13	1.4	0	0.0	0	0.0	13	1.3
Sniffed from plastic bag	41	4.3	0	0.0	1	3.0	42	4.1
Plastic bag over head	103	10.7	4	10.8	5	15.2	112	10.9
Mask or padding over face	18	1.9	0	0.0	1	3.0	19	1.8
Other	10	1.0	0	0.0	0	0.0	10	1.0
Not known	188	19.6	0	0.0	1	3.0	189	18.3
TOTAL for GAS FUELS	960	100.0	37	102.0	33	100.0	1030	100.0
AEROSOLS								
Directly into mouth	41	11.5	1	20.0	0	0.0	42	11.5
Sniffed from container	13	3.7	2	40.0	0	0.0	15	4.1
Sniffed from cloth or sleeve	91	25.6	1	20.0	2	50.0	94	25.8
Sniffed from plastic bag	67	18.8	0	0.0	1	25.0	68	18.6
Plastic bag over head	38	10.7	0	0.0	1	25.0	39	10.7
Mask or padding over face	10	2.8	0	0.0	0	0.0	10	2.7
Other	2	0.6	0	0.0	0	0.0	2	0.5
Not known	94	26.4	1	20.0	0	0.0	95	26.0
TOTAL for AEROSOLS	356	100.0	5	100.0	4	100.0	365	100.0
GLUES								
Directly into mouth	7	2.2	0	0.0	0	0.0	7	2.2
Sniffed from container	17	5.4	1	25.0	2	40.0	20	6.2
Sniffed from cloth or sleeve	3	1.0	0	0.0	0	0.0	3	0.9
Sniffed from plastic bag	147	46.7	1	25.0	0	0.0	148	45.7
Plastic bag over head	49	15.6	0	0.0	3	60.0	52	16.0
Mask or padding over face	6	1.9	1	25.0	0	0.0	7	2.2
Other	1	0.3	0	0.0	0	0.0	1	0.3
Not known	85	27.0	1	25.0	0	0.0	86	26.5
TOTAL for GLUES	315	100.0	4	100.0	5	100.0	324	100.0
OTHER *								
Directly into mouth	26	6.2	0	0.0	0	0.0	26	6.0
Sniffed from container	75	17.8	3	42.9	2	40.0	80	18.5
Sniffed from cloth or sleeve	98	23.3	3	42.9	0	0.0	101	23.3
Sniffed from plastic bag	38	9.0	0	0.0	0	0.0	38	8.8
Plastic bag over head	43	10.2	1	14.3	1	20.0	45	10.4
Mask or padding over face	18	4.3	0	0.0	2	40.0	20	4.6
Other	11	2.6	0	0.0	0	0.0	11	2.5
Not known	112	26.6	0	0.0	0	0.0	112	25.9
TOTAL for OTHER	421	100.0	7	100.0	5	100.0	433	100.0

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* "OTHER" includes fire extinguishers and substance not known

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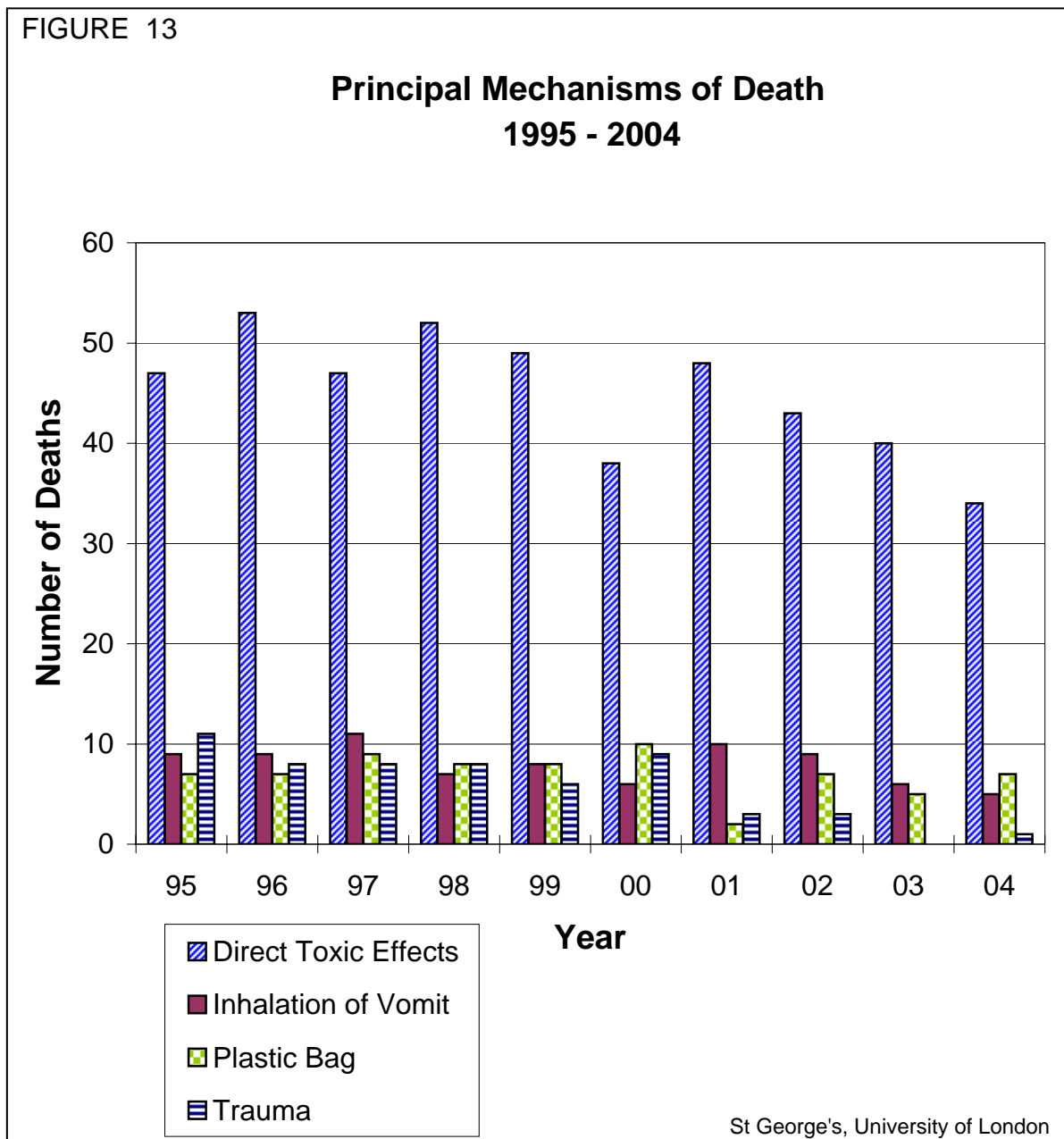
TABLE 13

**Mechanism of Death
1971-1994 and each year to 2004**

MECHANISM		YEAR											TOTAL
		71-94	95	96	97	98	99	00	01	02	03	04	
DIRECT TOXIC EFFECTS	No.	846	47	53	47	52	49	38	48	43	40	34	1297
	%	57.6	61.0	67.9	60.3	65.0	65.3	57.6	76.2	66.2	75.5	72.3	60.3
INHALATION of VOMIT	No.	229	9	9	11	7	8	6	10	9	6	5	309
	%	15.6	11.7	11.5	14.1	8.8	10.7	9.1	15.9	13.8	11.3	10.6	14.4
PLASTIC BAG	No.	167	7	7	9	8	8	10	2	7	5	7	237
	%	11.4	9.1	9.0	11.5	10.0	10.7	15.2	3.2	10.8	9.4	14.9	11.0
TRAUMA	No.	178	11	8	8	8	6	9	3	3	0	1	235
	%	12.1	14.3	10.3	10.3	10.0	8.0	13.6	4.8	4.6	0.0	2.1	10.9
OTHER	No.	4	1	1	0	1	0	1	0	0	0	0	8
	%	0.3	1.3	1.3	0.0	1.3	0.0	1.5	0.0	0.0	0.0	0.0	0.4
NOT KNOWN	No.	46	2	0	3	4	4	2	0	3	2	0	66
	%	3.1	2.6	0.0	3.8	5.0	5.3	3.0	0.0	4.6	3.8	0.0	3.1
TOTAL	No.	1470	77	78	78	80	75	66	63	65	53	47	2152
	%	100	100	100	100	100	100	100	100	100	100	100	100

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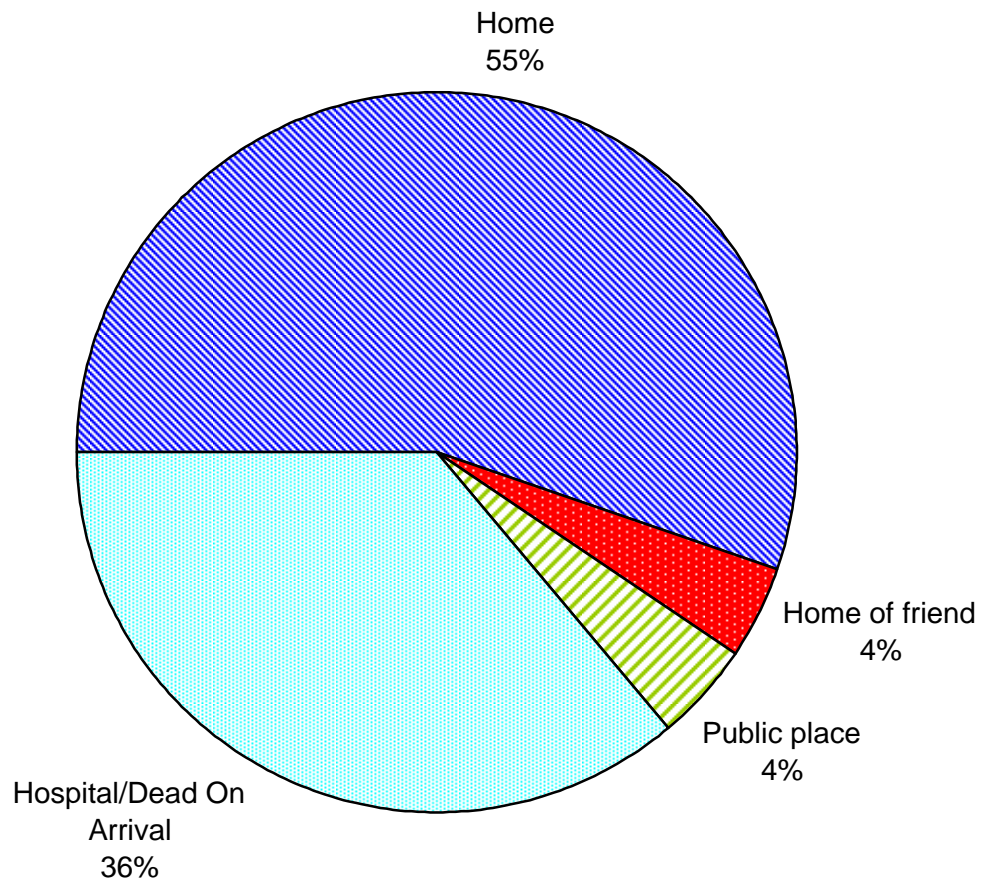


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FIGURE 14

Place of Death Percentages for 2004



Percentages may not add to 100% due to rounding

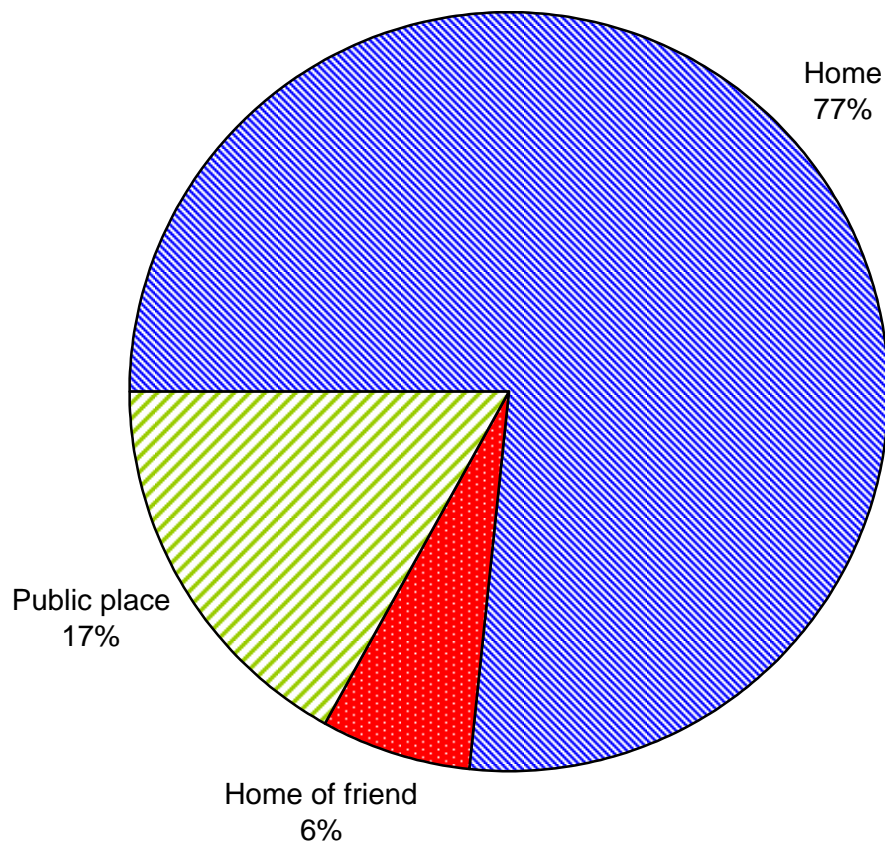
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FIGURE 15

Place Where Substance Was Abused Percentages for 2004



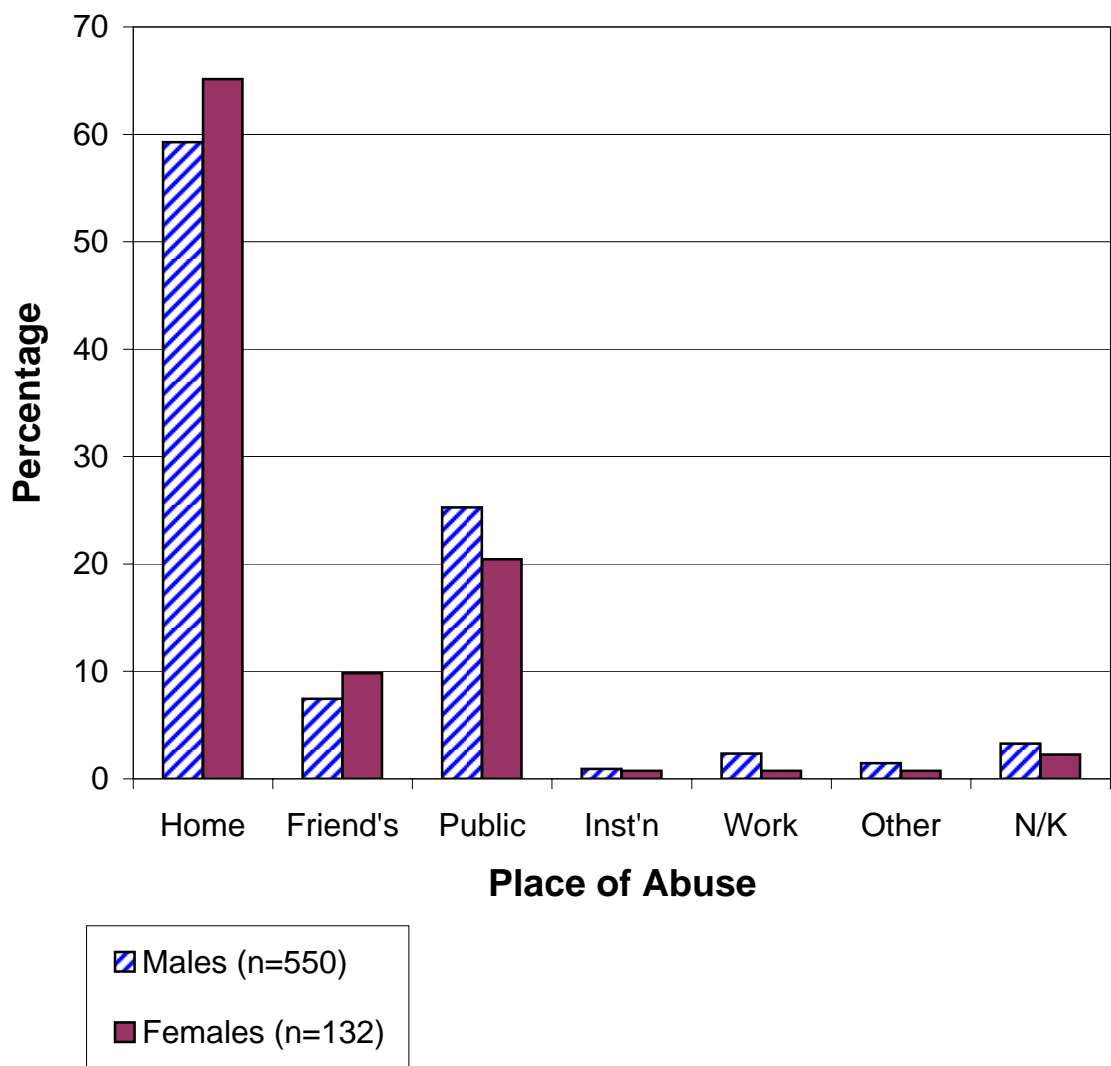
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FIGURE 16

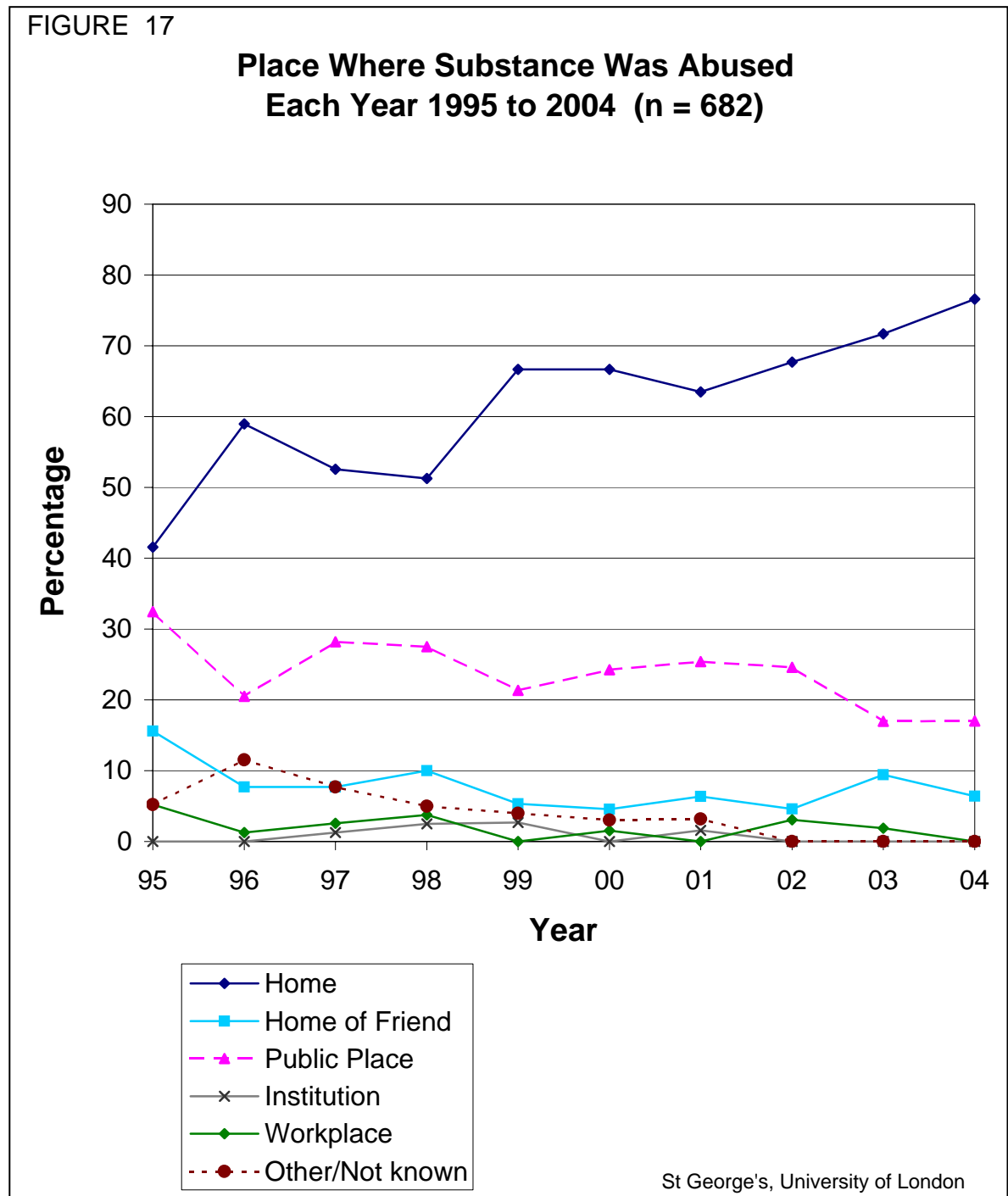
**Place Where Substance Was Abused
1995 - 2004
Males and females (n = 682)**



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TABLE 14

**Place of Abuse by Age
1995 - 2004**

AGE GROUP		Home	Home of Friend	Public Place	Institution/ Workplace	Other/ Not Known	Total No	Total %
Under 10	No.	1	0	2	0	0	3	0.4
	%	33.3	0.0	66.7	0.0	0.0		
10 - 14	No.	23	6	25	0	6	60	8.8
	%	38.3	10.0	41.7	0.0	10.0		
15 - 19	No.	116	35	82	10	8	251	36.8
	%	46.2	13.9	32.7	4.0	3.2		
20 - 24	No.	77	6	18	1	8	110	16.1
	%	70.0	5.5	16.4	0.9	7.3		
25 - 44	No.	155	7	36	6	7	211	30.9
	%	73.5	3.3	17.1	2.8	3.3		
45 +	No.	40	0	3	3	1	47	6.9
	%	85.1	0.0	6.4	6.4	2.1		
TOTAL	No.	412	54	166	20	30	682	100.0
	%	60.4	7.9	24.3	2.9	4.4		
Under 18	No.	99	32	89	4	11	235	34.5
	%	42.1	13.6	37.9	1.7	4.7		
18 and over	No.	313	22	77	16	19	447	65.5
	%	70.0	4.9	17.2	3.6	4.3		

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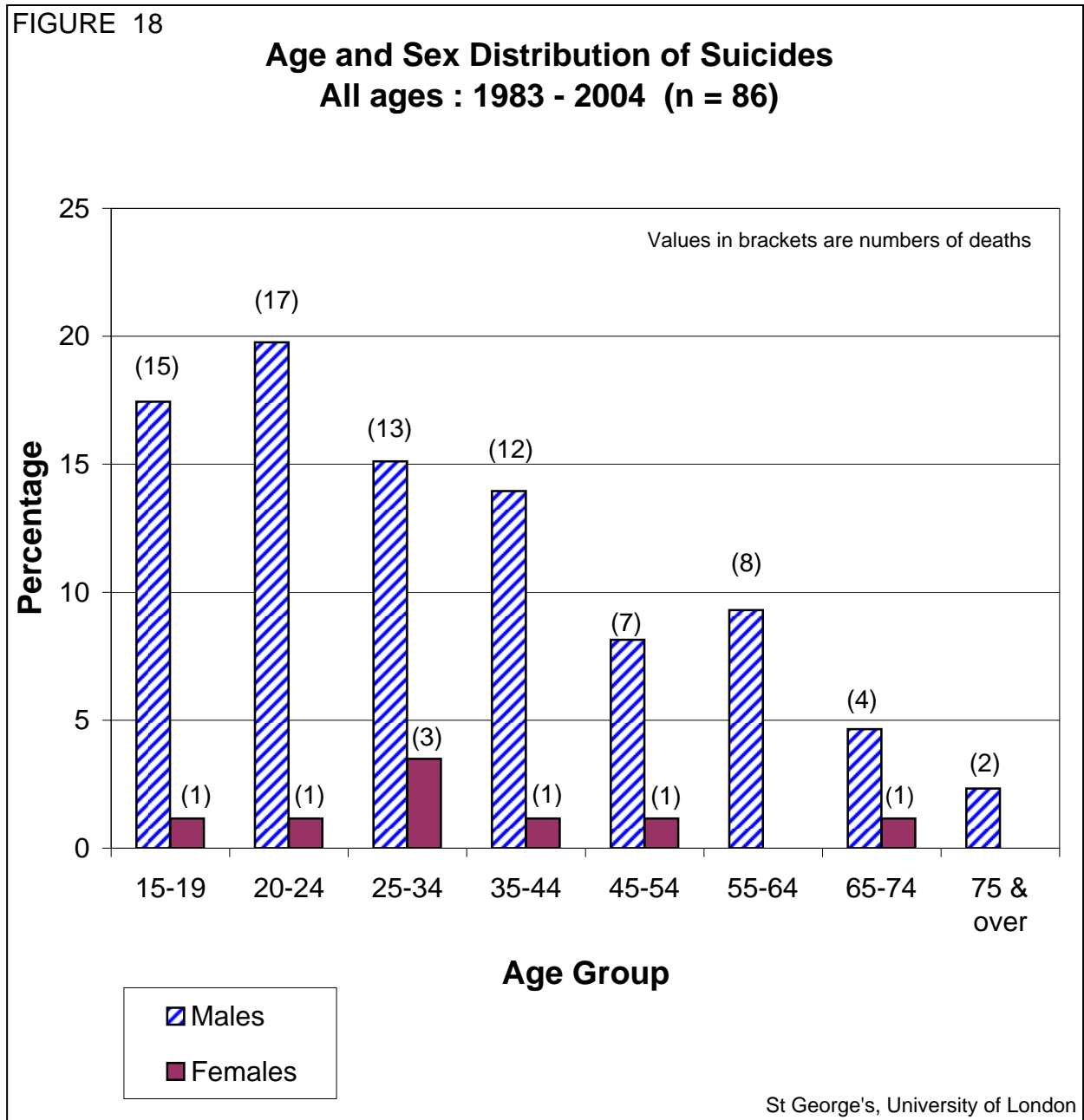
TABLE 15

**Number of Suicides Associated with VSA
1983 - 2004**

YEAR	Male	Female	Total	% of all VSA Deaths	Median age at death
1983	5	0	5	6.1	18
1984	3	0	3	3.5	40
1985	3	0	3	2.6	18
1986	7	1	8	7.8	20
1987	2	0	2	1.7	17
1988	1	0	1	0.7	55
1989	3	0	3	2.7	37
1990	1	0	1	0.7	23
1991	4	0	4	3.3	21
1992	5	1	6	7.1	23
1993	3	0	3	3.8	21
1994	1	0	1	1.5	27
1995	7	0	7	9.1	28
1996	4	2	6	7.7	38
1997	5	1	6	7.7	30
1998	3	0	3	3.8	34
1999	6	0	6	8.0	56
2000	3	0	3	4.5	38
2001	3	0	3	4.8	28
2002	3	2	5	7.7	40
2003	3	1	4	7.5	44
2004	3	0	3	6.4	53
Total Suicides	78	8	86	4.4	30

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