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Issued by

Defence Statistics (Health),
Oak 0 West, #6028,
Abbey Wood (North),
Bristol
BS34 8JH

Enquiries

Press Office:
Tel: 020 721 83253

Statistical Enquiries:

Head of Health
Defence Statistics
Tel: 03067 984423
Fax: 01179 130928
Email : DASA-Health-PQ-FOI@mod.uk

Internet

www.dasa.mod.uk

Feedback is Welcome

If you have any comments or questions about this publication or about Defence Statistics in general, you can contact us as follows:

E-mail:
DASA-enquiries-mailbox@mod.uk

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SUICIDE AND OPEN VERDICT DEATHS IN THE UK REGULAR ARMED FORCES 1984-2012

INTRODUCTION

1. This annual Statistical Notice provides summary information on suicides and open verdict deaths that have occurred among serving UK regular Armed Forces during the 20-year period 1993-2012. This information updates previous notices and includes new data for 2012. Following external consultation in February 2013 to ensure these statistics continue to meet user needs, this notice now provides numbers and rates for the latest 20-year period with all time trend graphs presenting rates since the start of data collection in 1984 (refer to '**Data Sources and Methods**' at the end of this notice). All future releases will be presented in this format.
2. This notice includes both coroner-confirmed suicides and open verdict deaths in line with the definition used by the Office for National Statistics (ONS) in the publication of National Statistics. In accordance with ONS practice, throughout this notice, the term 'suicide' should be understood to include all suicide and open verdict deaths. To ensure the highest accuracy of information and that all cases previously recorded as 'awaiting verdict' were followed up, Defence Statistics carry out an annual update with data held by the ONS and other authorities (refer to '**Data Sources & Methods**' and '**Changes in previously published data**').
3. The data are presented for the Naval Service (Royal Navy and Royal Marines), the Army (including the Gurkhas), and the Royal Air Force.
4. Due to the low numbers of cases among female Service personnel since 1993 (n=17), the analysis in this notice has been restricted to **males** only, aged 16-59 years.
5. Details of the data sources and methods used to collect and analyse the data and additional information not provided in this notice are available in the 1984-2002 notice on Defence Statistics' website. A summary can be found in the '**Data Sources & Methods**' section at the end of this notice.

KEY POINTS

6. For the 20-year period 1993-2012, 438 suicides and open verdicts occurred among UK regular Armed Forces personnel: 421 among males, and 17 among females. This represents an addition of seven deaths in 2012 and fourteen deaths that occurred in previous years and have now been given a suicide or open verdict (see paragraph 66 for more details).
7. All three Services have seen a declining trend in suicide rates since the 1990s.
8. For the 20-year period 1993-2012, the overall age-standardised suicide rate for the Army was significantly higher than for the other two services (12 per 100,000 strength compared to 8 per 100,000 for the Naval Service and 8 per 100,000 for the RAF).
9. Overall, male suicide rates for the UK regular Armed Forces as a whole and for each Service were significantly lower than the UK general population. The rates for each age group over 20 years were also significantly lower than would be expected in the UK general population; with the exception of Army personnel aged 20-24 for whom the risk of suicide was the same as the UK general population.
 10. The only age group with a statistically significant increased risk of suicides compared to the UK general population, were Army males aged less than 20, who had an 82% significantly increased risk (SMR=182, 95% CI:135-244). This increased risk of suicide was the same as previously reported in 2011. The population at risk of suicide in the UK Armed Forces remains the same as previous notices: young Army males (aged under 20 years).
11. Suicide rates by hanging, strangulation and suffocation increased in the 1990 (to 8 per 100,000 in 1996-2000) but have since fallen to between 2 and 5 per 100,000 in 2008-2012.

12. Suicide by the use of firearms, particularly in the Army, increased in the mid 1990s (to 7 per 100,000 strength in 1992-1996) but has since fallen to less than one per 100,000 in 2007-2011.
13. Suicide rates by the use of poisonous gases have fallen since the early 1990s (single Service rates which were between 4 and 8 per 100,000 strength in 1986-1990 have fallen to less than one per 100,000 in 2007-2011).
14. As 20 male deaths since 2007 (14 in 2012) are still under investigation by a coroner (waiting verdicts) data will be revised in subsequent statistical notices should the outcome of the inquests return a suicide or open verdict. Therefore findings for the most recent years may change.

RESULTS

15. Suicide in the Armed Forces is a rare event. In order to provide a balance between presenting analysis for a sufficient time period from which to provide meaningful data with the need to monitor the impact of MOD policy, this report will present time trend graphs since the start of data collection in 1984 and all tables and remaining graphs as numbers and rates aggregated for the latest 20 year period. Tables presenting the number of suicide and open verdicts (**Table A1 & A2**) and Army SMR for the under 24 age groups since 1984 (**Table A3**) can be found at **Annex A**.
16. Since the introduction of narrative verdicts in 2004, there has been an increase in the number returned by coroners in England and Wales¹. Defence Statistics have investigated the impact of narrative verdicts on the numbers of suicide and open verdict deaths reported for the UK Armed Forces. As there have only been three narrative verdicts between 2004 and 2012 where the mechanism of injury indicated possible suicide, Defence Statistics do not believe there has been a negative impact on the numbers and rates reported in this release.
17. Suicide remains a rare event in the UK regular Armed Forces; as a result some of the numbers presented in this statistical release are small. As such, when presenting rates and mortality ratios over time, the results can be affected when there are changes to the population at risk (the denominator). With the recent changes to the Armed Forces population through redundancy programmes, changes in recruitment patterns and the move to the new employment model and the new structures required to meet Future Force 2020², there will be an impact on the trends presented as the Armed Forces population shrinks and the age and gender profile of the serving population changes.
18. The confidence intervals presented in this publication provide the range of values within which we expect to find the real underlying value of the study indicator, with a probability of 95%. The width of the confidence interval gives an indication of how certain we can be about the reported statistic. The small numbers in some of the sub-group analysis presented in this notice may result in wide confidence intervals around the corresponding rate or ratio. Wide confidence intervals indicate the range in which we expect the true value of that statistic to lie is large and thus there is an increased risk of misinterpreting a chance occurrence for a true finding. Please see paragraphs 79 and 81 for more information about confidence intervals.

Overall Numbers by verdict

19. For the 20-year period 1993-2012, there were 438 suicides and open verdicts in the UK regular Armed Forces. A further 21 deaths have been referred to a coroner (or, for Scotland, the Procurator Fiscal) since 2007, where the mechanism of injury indicated possible suicide, which may be returned as suicides or open verdicts (14 of which occurred in 2012).
20. Only 17 cases (4%) occurred among female personnel during 1993-2012. Details of the verdicts by gender between 1993 and 2012 are shown in **Table 1** (on page 3).

¹ Office for National Statistics (2012) Suicide Rates in the United Kingdom, 2006 to 2010.

² https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/62487/Factsheet5-Future-Force-2020.pdf

Table 1: Suicide, open verdict and waiting verdict deaths¹ by Service and gender, 1993-2012, numbers and percentages².

Verdict	All		All Male		Female		Naval Service				Army				RAF			
	N	%	N	%	N	%	Male N	Male %	Female N	Female %	Male N	Male %	Female N	Female %	Male N	Male %	Female N	Female %
Suicide	316	100	304	96	12	4	43	14	3	<1	204	65	5	2	57	18	4	1
Open	122	100	117	96	5	4	22	18	1	<1	75	61	4	3	20	16	0	0
Waiting Verdicts ¹	21	100	20	95	1	5	3	14	0	0	14	67	1	5	3	14	0	0

¹Awaiting verdicts since 2007. See paragraph 68

²Percentages (%) have been rounded to the nearest whole number. For percentages greater than 0, but less than 1, "<1" is shown. Percentages may not add to 100% due to rounding.

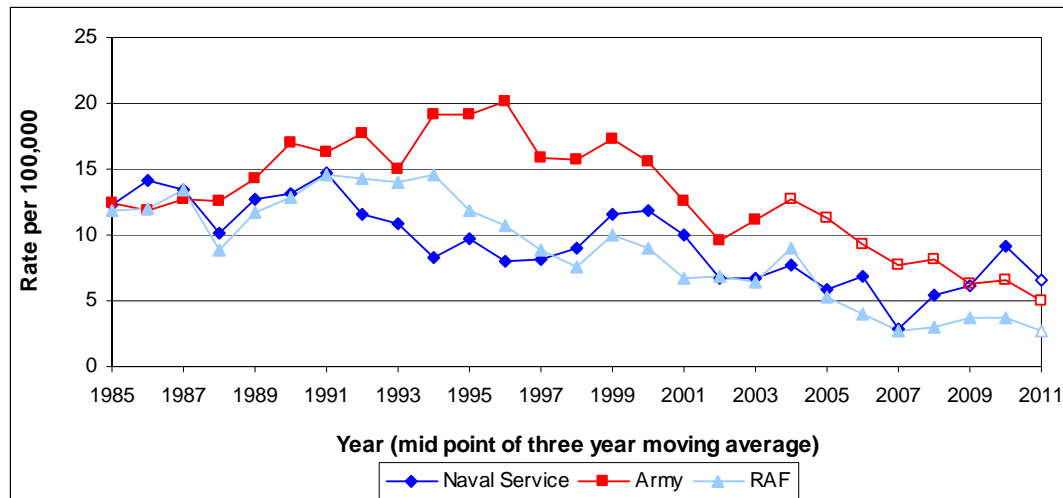
21. Due to the small number of suicides among UK Armed Forces females, all subsequent analysis, tables and graphs in this notice focus on suicides and open verdicts deaths, referred to jointly as 'suicides', among males aged 16-59 years only.

Trends over Time (1984-2012)

22. In order to compare trends in the rates for each Service over the period 1984-2012 and take into account the different age structures of the three Services, rates have been age-standardised. **Figure 1** illustrates these trends as a three-year moving average to eliminate some of the random year on year variation in rates due to the small numbers of suicides recorded and to give a clearer picture of possible trends.

23. All three Services have seen a declining trend in suicide rates since the 1990's. It should be noted that the rates presented for each Service may change when outstanding coroner verdicts are returned on deaths occurring since 2007 (see **Table 1**).

Figure 1: Male suicide rates by Service and three year time period¹, 1984-2012, age-standardised² rates per 100,000 strength^{3,4}.



¹ The year shown is the mid-point of a three-year average, e.g. 1985 refers to the period 1984-1986.

² Rates have been age standardised to the 2012 Armed Forces population, expressed per 100,000 strength.

³ If there are any waiting verdicts in the 3 year period, the data point is shown as hollow.

⁴ Values presented to two decimal places

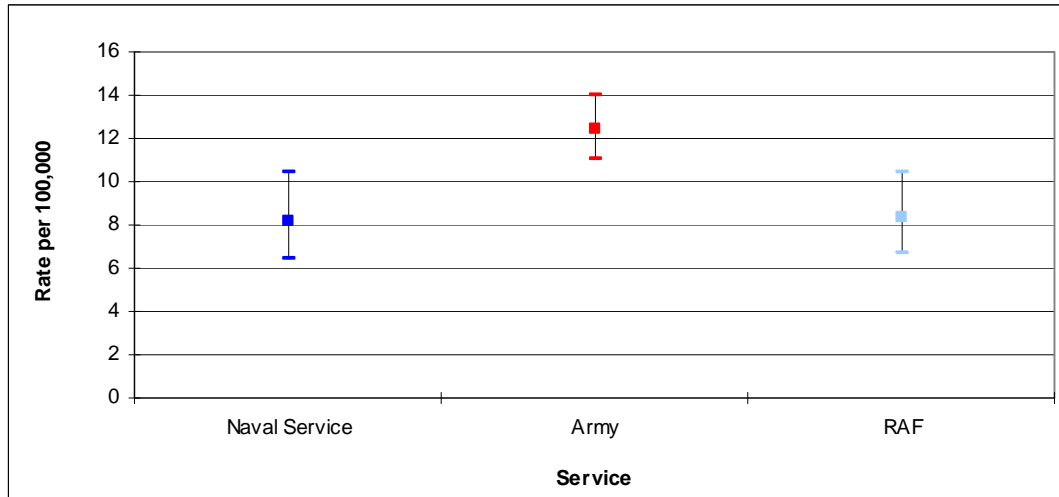
24. The Naval Service suicide rate peaked in 1990-1992 at 15 per 100,000 strength. It fell to a low of 3 per 100,000 strength in 2006-2008 (n=3) and rose to 9 per 100,000 in 2009-2011 (n=10). The actual number of deaths per year has not changed (reference **Table A1**), however, the changing structure of the Naval Service population (the denominator) resulted in an increase in the reported rate. The latest three-year rate was 7 per 100,000 in 2010-2012.

25. The Army suicide rate rose from 12 per 100,000 strength in 1984-1986 to 20 per 100,000 strength in 1995-1997. It fell from 7 per 100,000 in 2009-2011 (n=20) to a low of 5 per 100,000 strength in 2010-2012 (n=15).

26. The RAF suicide rate rose from 12 per 100,000 strength in 1984-1986 to 15 per 100,000 strength in 1990-1992. It fell from 4 per 100,000 in 2009-2011 (n=4) to a low of 3 per 100,000 strength in 2010-2012 (n=3).

20-year rate by Service and Age

Figure 2: Male suicide rates and 95% confidence intervals by Service, 1993-2012, age-standardised¹ rates per 100,000 strength².



¹ Rates have been age standardised to the 2012 Armed Forces population, expressed per 100,000 strength

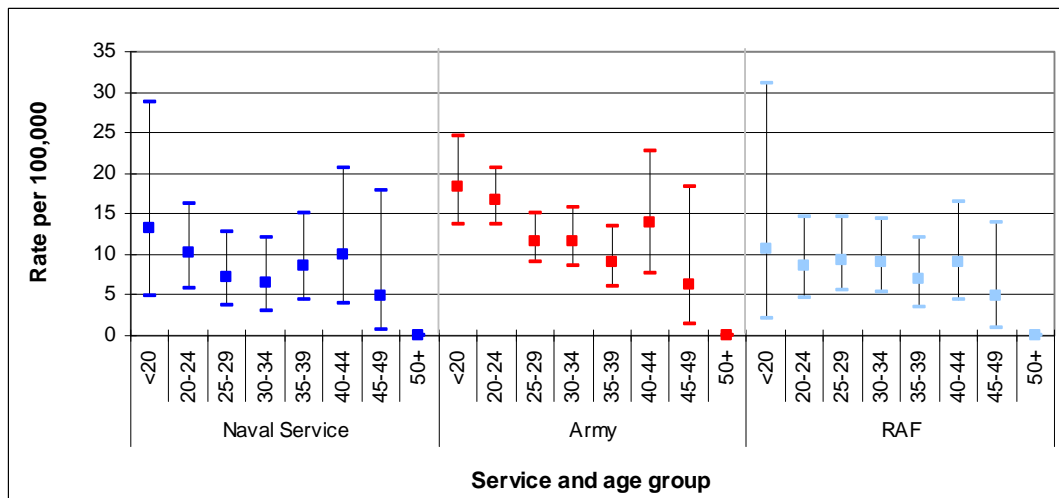
² Values presented to two decimal places

27. **Figure 2** illustrates that for the 20-year period 1993-2012, the Army had a significantly higher age-standardised suicide rate (12 per 100,000 strength, 95% CI: 11-14), than the Naval Service (8 per 100,000 strength, 95% CI: 6-10) or RAF (8 per 100,000 strength, 95% CI: 7-10).

28. For the 20-year period 1993-2012, trends in the 25-29 age groups and older were consistent across the three Services and show that suicide decreased with increasing age (**Figure 3**). Please note that the confidence intervals presented in Figure 3 were large for the under 20 age group and those in age bands over 40 years as this reflects the small numbers observed in these groups (see paragraph 51 for more information).

29. **Figure 3** shows the highest suicide rate for each Service were those aged under 20 years of age. The Army suicide rates in the under 20 and 20-24 age groups were higher compared to the same age groups in the Naval Service and RAF, however these differences were not significant.

Figure 3: Male suicide rates and 95% confidence intervals by Service and age group, 1993-2012, age-specific rates per 100,000 strength¹.

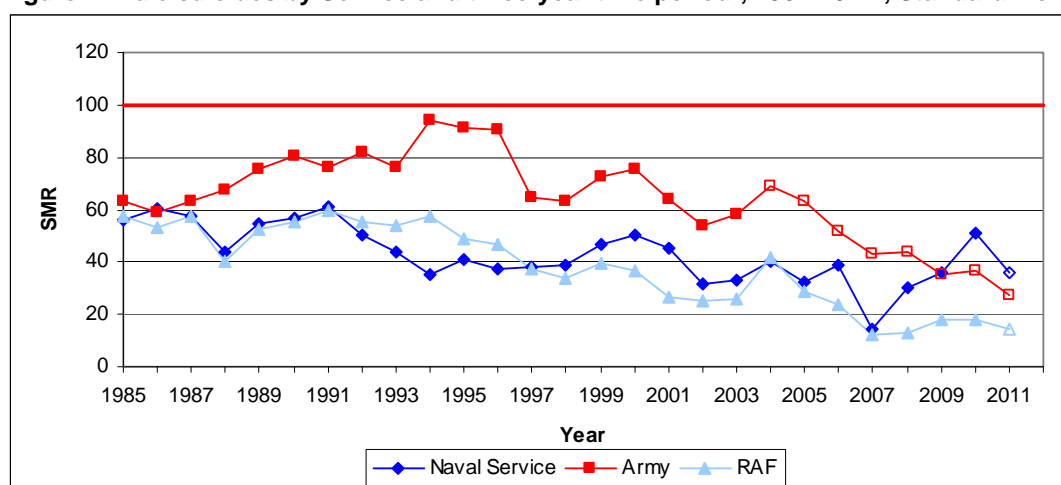


¹ Values presented to two decimal places

Comparisons with the UK General Population

30. In order to compare suicides among the UK regular Armed Forces with those among the UK general population, Standardised Mortality Ratios (SMR) have been calculated for each Service for the 29-year period 1984-2012 (shown in **Figure 4**) and age specific mortality ratios for each Service for the latest 20-year period (shown in **Table 2**). Yearly changes in the UK general population have been taken into account in these calculations. An SMR value less than 100 indicates lower rates in that particular group than in the corresponding group in the UK general population. An SMR value of greater than 100 indicates higher rates in that particular group than in the same group in the UK general population. If the 95% confidence interval does not encompass 100, then this difference is statistically significant. See the 'Data Sources & Methods' section for further details.

Figure 4: Male suicides by Service and three-year time period¹, 1984-2012², Standard Mortality Ratios⁴



¹ The year shown is the mid-point of a three-year average, e.g. 1985 refers to the period 1984-1986.

² Ratios have been standardised for age and calendar year.

³ If there are any waiting verdicts in the 3 year period, the data point is shown as hollow.

⁴ the red line indicates the value expected if the number of observed suicides in the UK Armed Forces was the same as the number expected based on the age structure of the UK population.

31. Since 1984, based on a three-year moving average, each of the three Services had suicide rates lower than would be expected in the UK general population if the UK Armed Forces had the same age and year profile as the UK general population (**Figure 4**).

32. The declining trend in suicide rates for each Service since the peak in the 1990's (illustrated in **Figure 1**) can also be seen in the mortality ratios in **Figure 4**, demonstrating a decreasing risk of suicide for each Service compared to the rate expected in the UK general population. The change in the Naval Service mortality ratio from an 85% decreased risk of suicide in 2006-2008 to a decreased risk of 49% in 2009-2011 was the result of a change in the structure of the Naval Service population (refer to paragraph 17) and not the result of an increase in the numbers of suicides in the Naval Service (see **Table A1**).

Table 2: Male suicides by Service and age group, 1993-2012, numbers, SMR¹ and age-specific mortality ratios².

Age	All		Naval Service		Army		RAF	
	n	SMR (95%CI)	n	SMR (95%CI)	n	SMR (95%CI)	n	SMR (95%CI)
All	421	51 (46-56)	65	38 (29-48)	279	63 (56-71)	77	35 (28-44)
Under 20	53	167 (128-219)	6	130 (48-283)	44	182 (135-244)	3	106 (22-308)
20-24	124	70 (59-84)	17	50 (29-81)	94	84 (69-103)	13	42 (22-72)
25-29	87	45 (36-55)	12	32 (16-55)	56	52 (40-67)	19	40 (24-63)
30-34	67	40 (32-51)	9	26 (12-50)	41	48 (35-65)	17	37 (21-59)
35-39	50	35 (26-46)	12	36 (18-62)	26	38 (25-55)	12	28 (15-50)
40-44	32	46 (32-65)	7	42 (17-86)	15	57 (32-94)	10	37 (18-69)
45-49	8	24 (10-47)	2	22 (3-80)	3	28 (6-82)	3	21 (4-63)
50+	0	-	0	-	0	-	0	-

¹ Ratios have been standardised for age and calendar year.

² Ratios have been standardised for calendar year.

33. For each Service and for the UK regular Armed Forces as a whole, the overall SMR shows that the suicide rate was statistically significantly lower than would be expected if the Armed Forces had the same age profile over time as the UK general population. The Naval Service was at a 62% decreased risk of suicide compared to the UK general population (SMR=38, 95% CI:29-48); the Army was at a 37% decreased risk of suicide compared to the UK general population (SMR=63, 95% CI:56-71); and the RAF was at a 65% decreased risk of suicide compared to the UK general population (SMR=35, 95% CI:28-44).
34. Overall, the age-specific mortality ratios for each Service, and for the UK regular Armed Forces as a whole, for each age group over the age of 20 years were also significantly lower than expected, with the exception of Army personnel aged 20-24 for whom the risk of suicide was no different to the UK population. The risk of suicide for Naval Service and RAF personnel aged under 20 years was no different to the UK population. Army males aged less than 20 had an 82% significantly increased risk of suicide (SMR=182, 95% CI:135-244) compared to the UK general population. This finding was consistent with the previous notice in 2012.
35. To further investigate the changing trends in Army suicides and the potential impact this may have had on the population at risk (Army males under 20 years) **Table 3** presents the trends over time for Army males in the under 20 and 20-24 age groups. It provides information on 20 years of male Army data in successive periods of five calendar years.

Table 3: Male suicides in Army personnel aged less than 25 years by five year time period & age group, 1993-2012, SMR¹ and age-specific mortality ratios².

Time period	Under 20		20-24	
	n	SMR (95%CI)	n	SMR (95%CI)
1993-2012	44	182 (135-244)	94	84 (69-103)
1993-1997	19	303 (182-473)	49	122 (92-161)
1998-2002	15	170 (95-280)	19	67 (40-105)
2003-2007	8	143 (62-282)	17	73 (42-116)
2008-2012	2	57 (7-205)	9	46 (21-87)

¹Ratios have been standardised for calendar year.

36. The downward trend for Army males as a whole (illustrated in **Figure 1**) was reflected in the age specific mortality ratios for the under 20 and 20-24 age groups with numbers decreasing in each successive five year period since the mid 1990's.
37. In the latest five year period, 2008-2012, there was no significant difference between the age specific mortality ratios of Army personnel under 20 and the UK general population (SMR=57, 95% CI:7-205). However, the small numbers in this age group result in wide confidence intervals for the SMR (see paragraphs 51 and 81).
38. In the latest five year period, 2008-2012, Army personnel aged 20-24 were at a significantly decreased risk of suicide compared to the UK general population (SMR=46, 95% CI:21-87).
39. The numbers presented in **Table 3** may be subject to change as deaths awaiting verdicts may be returned as suicides or open verdicts. For the time period 2008-2012, there are three deaths to Army males aged 20-24 and no deaths to Army males aged under 20 awaiting coroner verdicts.

Methods used to commit suicide

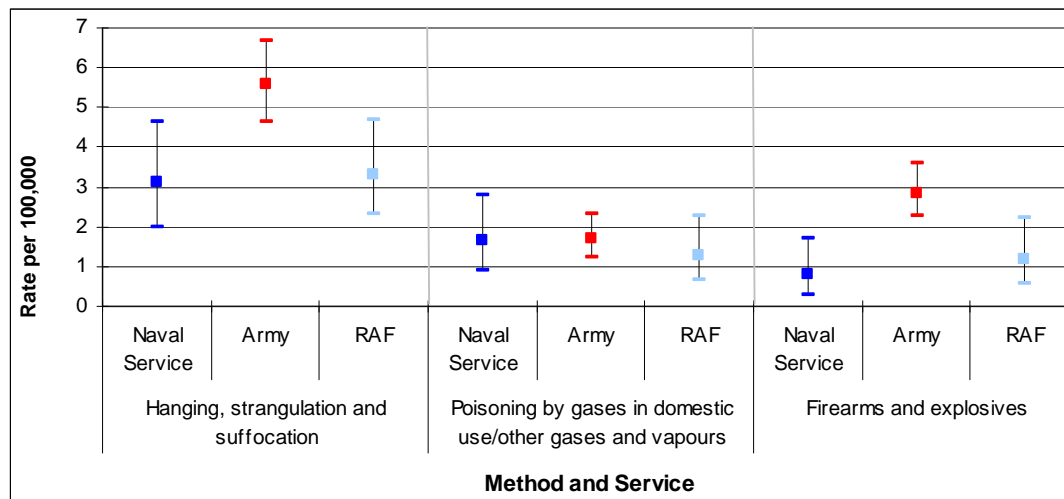
40. **Table 4** provides details of the methods used to commit suicide by personnel in all three Services over the period 1993-2012.
41. The following three methods account for 77% of all cases; hanging, strangulation and suffocation (41% of all cases); firearms and explosives (21% of all cases); and poisoning by gases in domestic use/other gases and vapours (15% of all cases – primarily car exhaust fumes).

Table 4: Male suicides by Service and method, 1993-2012, numbers and percentages¹.

	All		Naval Service		Army		RAF	
	n	%	n	%	n	%	n	%
All	421	100	65	100	279	100	77	100
Hanging, strangulation and suffocation	171	41	24	37	116	42	31	40
Firearms and explosives	89	21	6	9	73	26	10	13
Poisoning by gases in domestic use/other gases and vapours	63	15	14	22	37	13	12	16
Poisoning by solid or liquid substances	26	6	2	3	18	6	6	8
Road traffic incident	17	4	7	11	8	3	2	3
Jumping from a high place	15	4	5	8	7	3	3	4
Rail incident	12	3	2	3	5	2	5	6
Submersion (drowning)	5	1	0	0	3	1	2	3
Air transport incident	5	1	0	0	2	<1	3	4
Cutting and piercing instruments	2	<1	1	2	1	<1	0	0
Other and unspecified means	16	4	4	6	9	3	3	4

¹ Percentages (%) have been rounded to the nearest whole number. For percentages greater than 0, but less than 1, "<1" is shown. Percentages may not add to 100% due to rounding.

Figure 5: Male suicide rates and 95% confidence intervals by Service and method, 1993-2012, age-standardised rates¹ per 100,000 strength².



¹Rates have been age standardised to the 2012 Armed Forces population, expressed per 100,000 strength

² Values on graph presented to two decimal places

42. **Figure 5** illustrates that for the method of hanging, there was no significant difference in the suicide rates between the three services.

43. For the method of firearms and explosives, there was no significant difference in the suicide rate between the three Services (Army males: 2.9 per 100,000 strength, 95% CI: 2-4; Naval Service males: 1 per 100,000 strength, 95% CI: 0-2 and RAF males: 1 per 100,000 strength, 95% CI: 1-2).

44. For the method of poisoning by gases in domestic use/other gases and vapours, there was no significant difference in the suicide rates between the three Services.

45. **Figures 6, 7 and 8** illustrate the changes in the use of these three methods over the period 1984-2012. Due to small numbers involved, the data have been aggregated to give five year moving averages. This eliminates some of the random variation that can occur and provides a clearer picture of possible trends.

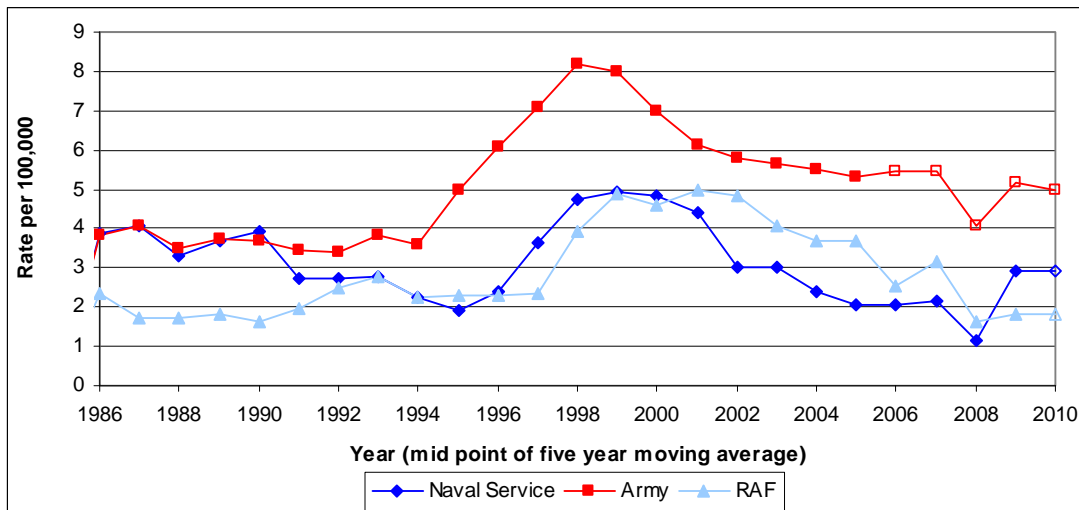
46. **Figure 6** illustrates that use of hanging, strangulation and suffocation increased in all three Services from the mid 1990s to the years 1996-2000 (to 8 per 100,000 in 1996-2000). There has been a declining trend in the use of this method since then for all three Services to between 2 and 5 per 100,000 in 2008-2012; however Naval Service rates have risen from a low of 1 per 100,000 in 2006-2010 to 3 per 100,000 in 2008-2012. This rise should be interpreted with caution as it is based on a small increase in the number of Naval Service suicides using this method, from two deaths in the period 2006-2010 to five deaths in the

period 2008-2012.

47. **Figure 7** illustrates that use of firearms and explosives in the Naval Service and RAF have remained low throughout the period 1984-2012. It is worth noting that the rise for the RAF in the period 2001-2005 has been affected by the very small numbers (three cases in 2003 and one case in 2004), therefore this rise is likely due to a chance variation rather than the appearance of a new trend. Similarly, the small rise in the Naval Service rate in 2008-2012 involves one case in 2009 and two in 2010. Use of firearms and explosives appears to have changed noticeably in the Army: increasing from the beginning of the period to the mid-1990s, followed by a clear fall since then from 7 per 100,000 in the period 1992-1996 to less than one per 100,000 in the period 2008-2012.

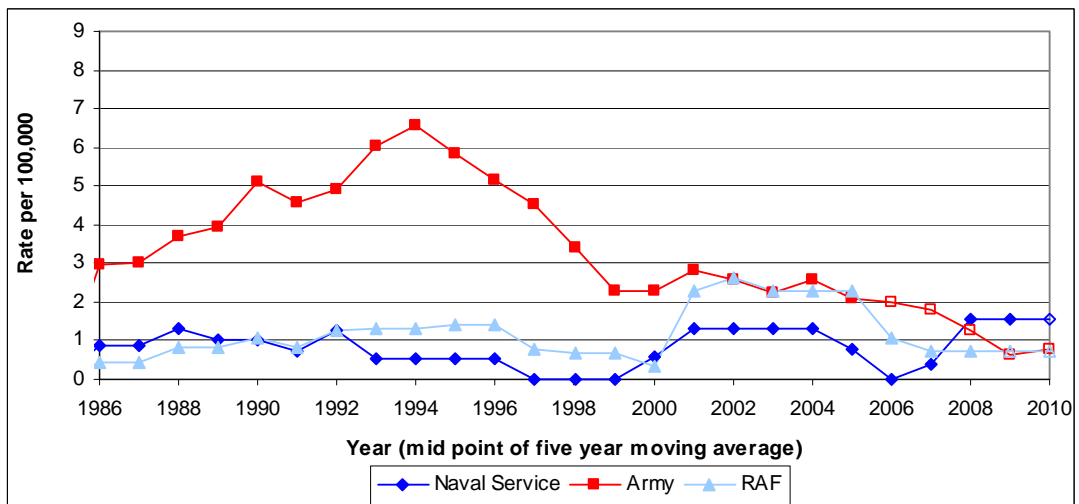
48. **Figure 8** illustrates that use of poisoning by gases in domestic use/other gases and vapours has been on the decline in all three Services since the early 1990s. Single Service rates which were between 4 and 8 per 100,000 strength in 1986-1990 have fallen to less than one per 100,000 in 2008-2012.

Figure 6: Male suicide rates by the use of hanging, strangulation and suffocation by Service and five year time period¹, 1984-2012, age-standardised² rates per 100,000 strength^{3,4}.



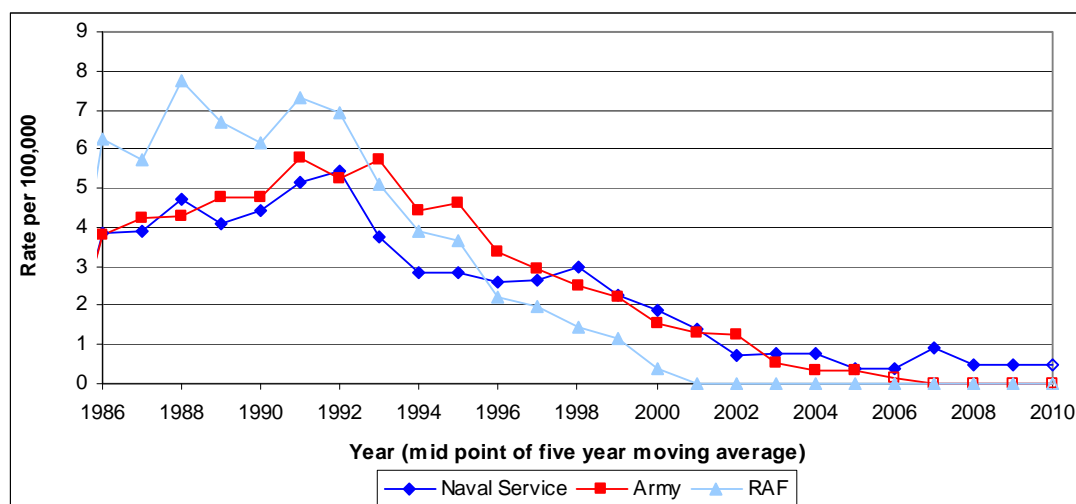
¹ The year shown is the mid-point of a five-year average, e.g. 1985 refers to the period 1983-1987.
² Rates have been age standardised to the 2012 Armed Forces population, expressed per 100,000 strength.
³ If there are any waiting verdicts in the 5 year period, the data point is shown as hollow.
⁴ Values presented to two decimal places.

Figure 7: Male suicide rates by the use of firearms and explosives by Service and five year time period¹, 1984-2012, age-standardised² rates per 100,000 strength^{3,4}.



¹ The year shown is the mid-point of a five-year average, e.g. 1985 refers to the period 1983-1987.
² Rates have been age standardised to the 2012 Armed Forces population, expressed per 100,000 strength.
³ If there are any waiting verdicts in the 5 year period, the data point is shown as hollow.
⁴ Values presented to two decimal places.

Figure 8: Male suicide rates by the use of poisoning by gases in domestic use/other gases and vapours by Service and five year time period¹, 1984-2012, age-standardised² rates per 100,000 strength^{3,4}.



¹ The year shown is the mid-point of a five-year average, e.g. 1985 refers to the period 1983-1987.

² Rates have been age standardised to the 2012 Armed Forces population, expressed per 100,000 strength.

³ If there are any waiting verdicts in the 5 year period, the data point is shown as hollow.

⁴ Values presented to two decimal places.

DISCUSSION

49. This paper presents the number and rates of suicides among the UK regular Armed Forces over the 20-year period 1993-2012 and includes comparisons with the UK general population.

50. Between 1993 and 2012, there were 316 coroner-confirmed suicides and 122 open verdict deaths, 21 deaths are waiting for coroner inquests, 2 of which are from 2011 and 14 in 2012. Once the coroners' verdicts are received the recorded number of suicides, and corresponding rates, may increase. Interpretation of recent trend data may be affected.

51. The analyses made here are based on relatively small numbers. This presents a particular challenge for complex and detailed statistical analysis. As this notice presents several sub-group analyses, in which some categories may only involve a handful of cases, there is a risk of misinterpreting a chance occurrence for a true finding. This is evidenced by the wide range in some of the confidence intervals presented in this statistical release and the apparent emergence of changing trends (such as rises in the rate of Naval Service deaths and deaths by hanging). We strongly recommend caution in reading too much into trends involving small numbers.

52. Overall comparisons using male-specific rates show that the Army had a significantly higher rate of suicides than the Naval Service and the RAF. For each Service, rates were highest for those under 20 years of age. There were no significant differences in the age groups between each of the Services. It is important to bear in mind that while these analyses take account of the different age structures of the three Services, they make no allowance for other, largely occupational, confounding factors specific to the single Services which may have had an impact on the findings observed.

53. There have been some noticeable falls in recent years, particularly among male Army personnel :

- Age-standardised rates fell from a high of 20 per 100,000 strength in 1995-1997 to 5 per 100,000 strength in 2010-2012 (illustrated in **Figure 1**).
- Age-specific mortality ratios for the under 20 and 20-24 age groups showed a peak during 1993-1997, and a subsequent fall in the five year periods since this point (shown in **Table 3**).
- For the latest five year period, 2008-2012, there was no increase in risk of suicide for Army personnel aged less than 20 compared to the UK population. The risk for the 20-24 age group in this period was significantly lower than the UK population (shown in **Table 3**). This lowered risk should be interpreted with caution as the small number of waiting verdicts for this age group may be sufficient to alter the figures should they be returned as suicides by a coroner.

54. The use of SMR is a standard epidemiological technique for comparing mortality rates among an

occupational cohort with a standard population. In this notice, SMR were calculated to allow comparisons between the three Services and the UK general population. Overall, for the 20-year period 1993-2012, the UK regular Armed Forces and each individual Service had a significantly lower number of suicides than would be expected if the Armed Forces had the same age and year profile as the UK population. For each Service, all age groups over the age of 20 were at a significantly lower risk than the UK general population with the exception of Army males aged 20-24 whose risk of suicide was no different to the UK general population. The only age group for whom the mortality ratio was significantly higher were Army males aged under 20, with an SMR of 182 (95% CI: 135-244, n=44), this group were also identified as at risk in the previous notice. SMR for each five-year period since 1998 showed the risk of suicide in young Army males aged under 20 was no different than the UK population.

55. The low SMR and age-specific mortality ratios may partially be explained by the 'healthy worker effect' often observed in occupational studies. This is deemed to occur when 'workers' are found to have lower mortality or other adverse health outcome rates than the general population due to the fact that certain groups of people are excluded from employment, particularly those who are ill or who have disabilities. This is to be expected in studies of Armed Forces mortality, as they are generally a highly selected group of individuals who are likely to have higher than usual levels of fitness and possibly lower levels of ill-health.
56. A number of other factors, specific to Service life both on and off duty, may also play a role in reducing the risk of suicide reflected in these low SMR. For instance, the strong group loyalty, bonding and mutual dependence encouraged at all levels in the Services, particularly in small combat units.
57. Some known suicide risk factors identified from academic research into the general population or other specific occupation groups remain unexplored at present. Defence Statistics are engaged in collaborative work with external academic colleagues in order to address some of these issues, such as psychiatric and physical morbidity.
58. The likelihood of committing suicide depends to some extent on the ease of access to, and knowledge of, an effective method. Three main types of method were used in 77% of the suicides reported in this notice: hanging, strangulation and suffocation (41%), firearms and explosives (21%) and poisoning by gases in domestic use/other gases and vapours (15%). Firearms and explosives were used mostly in the Army (Army firearms and explosives suicide deaths accounted for 82% of all firearms and explosives suicide deaths). This reflects the greater access to firearms and explosives in that particular Service.
59. It is clearly important to understand the link between access to means and trends over time as this may aid policy makers to introduce preventative measures with the aim of reducing the incidence of suicides in the Services. The reduction in suicides by the use of poisoning by gases in domestic use/other gases and vapours across all three Service since the early 1990s is thought to reflect the change to catalytic converters on cars and in the size of the exhaust pipe.
60. The increase in the use of hanging, strangulation and suffocation across all three Services in the 1990s may have partly been a response to the new difficulties presented by the use of poisoning by gases in domestic use/other gases and vapours. All three Services appear to show a decline in hanging, strangulation and suffocation in recent years; however Naval Service and Army rates have increased in 2008-2012. Caution should be taken in interpreting this finding as a rise in rates of hanging, strangulation and suffocation were based on a small number of suicides within each Service.
61. The changes in the use of firearms and explosives in Army males (illustrated by **Figure 8**), particularly the steep decline since 1992-1996 (from 7 per 100,000 strength to less than 1 per 100,000 by 2007-2011) has played a major part in the overall decline in the Army rates shown in **Figure 1**. This decline has been accelerated in recent years by similar declines observed in the use of poisoning by gases in domestic use/other gases and vapours as well as the use of hanging, strangulation and suffocation, as mentioned above.

CONCLUSIONS

62. This is the first publication of this notice based on the overall number of suicides in the UK regular Armed Forces over a twenty year period 1993-2012. However, the findings are similar to those published in 2012 covering the 28 year period 1984-2011.
63. The analyses provided here are based on small numbers. This is evidenced by the wide range in the confidence intervals presented in this publication and we strongly recommend caution in reading too much into past trends and to continue to do so in the future.

64. This update shows a declining trend for all three Services, particularly in the suicide rates among young Army males in the use of hanging, strangulation and suffocation, poisoning by gases in domestic use/other gases and vapours and the use of firearms and explosives.
65. There has been an increase in rates of Naval Service suicide since 2007, however, due to the small numbers involved, it remains to be seen if this is due to chance variation rather than an appearance of a new trend.

CHANGES IN PREVIOUSLY PUBLISHED DATA

66. In preparing this document, Defence Statistics carried out a review of the data recorded on deaths to Service personnel to ensure the highest accuracy of information and that all cases previously recorded as 'awaiting verdict' have been followed up with the ONS and other authorities.:
- Fourteen deaths previously reported as waiting verdicts have now been notified as suicides :
 - One waiting verdict from 2008 has now been notified as an open verdict
 - One waiting verdict from 2009 and one from 2010 have now been notified as suicides
 - Eleven of those waiting verdicts have now been notified as suicides for the year 2011.
 - Fourteen new waiting verdicts for 2012
 - Two deaths previously reported as 'other accidents' for the year 1999 and one death for 2000 have now been included as suicides following an internal review of records.

DATA SOURCES & METHODS

Data Sources

67. Defence Statistics receive weekly notifications of all UK regular Armed Forces deaths from the Joint Casualty and Compassionate Centre (formerly the Single Service Casualty Cells). Defence Statistics also receive cause of death information from military medical sources in the single Services and the Defence Inquest Cell. At the end of each calendar year, Defence Statistics cross-reference the in-Service deaths notifications it holds against publicly available death certificate information available from the NHS. Regarding suicides and open verdicts, to ensure the highest accuracy of information and that all cases previously recorded as 'awaiting verdict' have been followed up, Defence Statistics carry out an annual audit of MOD data with that held by the ONS and other authorities, including the GRO and NISRA.
68. Defence Statistics regularly check all deaths against the information held on the Armed Forces Memorial Database (AFMDB) owned by the Joint Casualty and Compassionate Centre (JCCC).
69. Defence Statistics also regularly check all deaths for information on coroner's verdicts (England & Wales) and the results of investigations by the Procurator Fiscal for Scotland where possible. For Northern Ireland, Defence Statistics liaise with the Northern Ireland Statistics and Research Agency (NISRA) who handle the official information on behalf of the Northern Ireland Office. In this notice, all these sources of information are referred to as "coroner's verdicts". There is an obligation for all accidental deaths, and those resulting from violent action, to be referred to these officials. Inquests are usually held within a few months of the death, but occasionally a few years may elapse, therefore some recent deaths may not have clearly defined causal information. In these cases, deaths are identified as waiting verdicts and are not analysed in the main body of this notice.
70. Defence Statistics have undertaken a review of the deaths for which a verdict was outstanding (waiting verdict), as a proportion of those reported in this notice occurred a number of years ago and in some instances the deaths occurred overseas. Following investigations with ONS and the Defence Inquest Unit, Defence Statistics have been unable to trace awaiting verdicts prior to 2007 and it has been deemed unlikely that the final outcome of these deaths (such as inquests) will be traced. The majority of the waiting verdicts that Defence Statistics were aware of prior to 2007 were for deaths that occurred to Service personnel overseas. As such Defence Statistics have identified that the earliest death still awaiting a coroner's inquest occurred in 2007. Thus the waiting verdicts identified in **Table 1** cover the period 2007-2012, these records will be updated once the result of the coroner inquests are made available.
71. One UK Armed Forces death in 1994 and one in 2003 given an open verdict by the coroner have been included as hostile action deaths and not a suicide and open verdict death. There was an additional death in 2003 returned as an open verdict by the Procurator Fiscal for Scotland, which has been classified as an RTA, as it was an incident involving multiple deaths and an MOD Board of Inquiry found all the deaths to be the result of an operational accident.
72. Deaths data in England and Wales are supplied by and used with the permission of ONS. Deaths in Northern Ireland are supplied by and used with the permission of NISRA and GRO supply deaths in Scotland.
73. For a detailed description of the sources of data used in this notice and their analysis refer to the references cited below.

Data coverage

74. Deaths presented here are for the UK regular Armed Forces. The dataset includes all trained and untrained regular Service personnel. Non-regular Service personnel that were deployed on operations at the time of their death are also included. The data here exclude the Home Service of the Royal Irish Regiment, full time reservists, Territorial Army and Naval Activated Reservists who were not deployed on operations at the time of their death, as Defence Statistics do not receive routine notifications of all deaths among reservists and non-regulars, and because reliable denominator data to produce interpretable statistics are not available.
75. In 2012, Defence Statistics undertook a review of all Armed Forces personnel data from the Joint Personnel Administration (JPA) system. This resulted in very small changes for Armed Forces strength data from May 2009 to October 2011 (inclusive). In previous publications of this report all JPA data was considered provisional but this annual publication incorporates the finalised JPA strengths figures for the first time.
76. In February 2013, Defence Statistics undertook an external consultation to ensure these statistics continue to meet user needs. The outcome of the six week consultation period was to change the information in the notice to present time trend graphs since the start of data collection in 1984 and all tables and remaining graphs as numbers and rates aggregated for the latest 20 year period. As suicide is a rare event, this will provide a balance between presenting analysis for a sufficient time period from which to provide meaningful data with the need to monitor the impact of MOD policy and initiatives.

Methods

77. In order to compare time trends and to take into account the different age and gender structures of their respective single Service strengths, rates have been age and gender standardised. In order to facilitate comparisons with previously published reports data has been standardised to the 2012 Armed Forces population. For this direct standardisation process, Defence Statistics have estimated the rates that would have been observed if each study population (i.e. each of the single Services) had the same age structure as the standard population (the 2012 male Armed Forces population).
78. The effects of standardisation may, on occasion, lead to unexpected results particularly where small numbers are involved. Where several years' data are presented rates may fluctuate from one year to the next owing to the small number of cases involved and to relative changes in strengths, although effects of the latter are less noticeable. Standardised rates can also be strongly influenced by variations in the age and gender structure of the deaths concerned, even when totals may remain the same, as seen in 2012 for the Naval Service overall rate of suicides, caused by the reduction in recruitment of personnel less than 20 years of age.
79. The 95% confidence interval for a rate provides the range of values within which we expect to find the real value of the indicator under study, with a probability of 95%. If a 95% confidence interval around a rate excludes the comparison value, then a statistical test for the difference between the two values would be significant at the 0.05 level. If two confidence intervals do not overlap, a comparable statistical test would always indicate a statistically significant difference. The small numbers in some of the sub-group analysis may result in wide confidence intervals around the corresponding rate or ratios. The impact of this is that the range in which we expect the true value of that statistic to lie is much larger, making it harder to interpret the true underlying value.
80. To enable comparisons with deaths in the UK population, Standardised Mortality Ratios (SMR), adjusted for age, gender and year, were calculated. An SMR is defined as the ratio of the number of deaths *observed* in the study population to the number of deaths *expected* if the study population had the same age- and gender-specific rates as the standard population in each specific year multiplied by 100 by convention. An SMR over (or under) 100 indicates a higher (or lower) number of observed deaths than expected (based on standard population rates). An SMR of 100 implies that there is no difference in rates when comparing the UK Regular Armed Forces population with the UK population.
81. The 95% confidence interval for a SMR provides the range of values within which we expect to find the real value of the indicator under study, with a probability of 95%. If the confidence interval for an SMR does not include 100, the result is deemed to be statistically significant. The small number in some of the sub-group analysis may result in wide confidence intervals in the corresponding ratio. The impact of this is that the range in which we expect the true value of that statistic to lie is much larger, making it harder to interpret the true underlying trend.
82. The UK general population data for 2011 and 2012 were not available for this report to calculate standard mortality ratios (SMR), therefore, Defence Statistics has used the 2010 data as an estimate for the 2011 and 2012 figures as there is little year on year variation for the UK figures. Thus, any patterns reported here may be subject to minor fluctuations when the 2011 and 2012 data becomes available.
83. In 2006 the ONS changed from reporting the number of deaths that occurred in each year to the number of deaths that were registered in each year. A major driver for this change was that for an annual extract of death occurrences to be acceptably complete, it must be taken some months after the end of the data year to allow for late death registrations. Therefore the UK death data used by Defence Statistics up to and including 2005 is based on deaths that occurred in the year. The UK death data used by Defence

Statistics for 2007 onwards is based on deaths that were registered in the year. To produce the UK death data for 2006 Defence Statistics have followed advice provided by the ONS and used deaths that both occurred and were registered in year. Using UK population deaths that both occurred and were registered in year resulted in an increased denominator population for the 2006 SMR calculation and has therefore resulted in a lower SMR for 2006 (when compared with the 2006 SMR reported in publications before this change in methodology). Users should note that this revised corrected methodology has brought the 2006 SMR calculations in line with the SMR calculations for other years.

84. Whilst values are presented to two decimal places in the graphs in this report for accuracy, the values presented in the text are as whole values due to the small numbers of suicide and open verdict deaths.

Strengths and weaknesses of data presented in this notice

85. A strength of this publication is that considerable validation is undertaken against military and public records to ensure that the information provided is complete and accurate and users of this publication should be confident that the numbers of suicide and open verdict deaths presented are accurate.
86. However, Suicide and Open Verdict deaths require a Coroner's report before the cause of death can be formally classified and there is often a time lag between when the death occurred and when the Coroner's inquest takes place. This can result in final cause of death information not being timely and complete for recent years and these deaths are reported as other accidents whilst waiting for final cause of death to be determined (and thus not included in this report beyond capturing the number of waiting verdicts in Table 1). This can lead to revisions in the cause of death categories when these verdicts are returned (see paragraph 66 for more information about the extent of these revisions).
87. In addition, deaths certificates for Service personnel who die overseas are issued by the MOD and if buried overseas, are not always subject to a coroner's inquest to certify cause of death. Users should be aware of this when using the information presented in this notice.
88. The information presented in this publication has been structured in such a way to release sensitive deaths information into the public domain in a way that contributes to the MOD accountability to the British public but which doesn't compromise the operational security of UK Armed Forces personnel nor that risk breaching the rights of the families of the deceased personnel (for which the MOD has a residual duty of care).

REFERENCES

- i. Blatchley, N. F., Ward, V. R., & Fear, N. T. (2004). Suicide and open verdict deaths among males in the UK regular Armed Forces, 1984-2003. DASA; Ensligh, Bath.
- ii. Ward, V. R., & Fear, N. T. (2004). Suicide and open verdict deaths among males in the UK regular Armed Forces, 1984-2002: Methods used to commit suicide. DASA; Ensligh, Bath.

Annex A – UK Armed Forces Suicides 1984-2012, additional tables

Table A1 : UK Armed Forces¹ Suicide and open verdict deaths by year, gender and Service, 1984 to 2012, numbers

Year	All	Gender		Service		
		Male	Female	Naval Service	Army	RAF
All	778	755	23	131	479	168
1984	27	26	1	3	15	9
1985	30	29	1	8	17	5
1986	44	44	0	9	20	15
1987	27	26	1	5	14	8
1988	41	40	1	8	25	8
1989	36	35	1	4	25	7
1990	50	49	1	10	24	16
1991	48	48	0	9	29	10
1992	37	37	0	6	22	9
1993	43	42	1	5	25	13
1994	34	34	0	6	20	8
1995	43	42	1	2	32	9
1996	32	31	1	7	19	6
1997	26	26	0	4	17	5
1998	19	19	0	2	13	4
1999	30	29	1	6	20	4
2000	37	36	1	6	23	8
2001	16	16	0	2	12	2
2002	15	13	2	4	11	0
2003	25	23	2	3	15	7
2004	20	18	2	2	16	2
2005	22	22	0	5	13	4
2006	12	12	0	0	10	2
2007	10	9	1	4	6	0
2008	10	9	1	0	8	2
2009	15	15	0	3	10	2
2010	7	6	1	4	2	1
2011	15	13	2	4	10	1
2012	7	6	1	0	6	1

1. Figures are for regular personnel and only those reservists who have died whilst on operational deployment. Figures include male and female personnel.

Table A2: Suicide, open verdict and waiting verdict deaths by Service and gender, 1984-2012, numbers and percentages¹.

Verdict	All		All		All		Naval Service				Army				RAF			
	Male		Female		Male		Female		Male		Female		Male		Female			
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%		
Suicide	599	100	581	97	18	3	89	15	3	<1	365	61	9	2	127	21	6	1
Open	179	100	174	97	5	3	38	21	1	<1	101	56	4	2	35	20	0	0
Waiting Verdicts ¹	21	100	20	95	1	5	3	14	0	0	14	67	1	5	3	14	0	0

¹ Awaiting verdicts since 2007. See paragraph 68

² Percentages (%) have been rounded to the nearest whole number. For percentages greater than 0, but less than 1, "<1" is shown. Percentages may not add to 100% due to rounding.

Table A3: Male suicides in Army personnel aged less than 25 years by five year time period & age group, 1984-2012, SMR¹ and age-specific mortality ratios².

Time period	Under 20		20-24	
	n	SMR (95%CI)	n	SMR (95%CI)
1984-2012	71	144 (114-182)	165	83 (71-96)
1984-1988	10	71 (34-130)	33	73 (52-102)
1989-1993	23	184 (117-276)	49	94 (71-124)
1994-1998	15	235 (132-388)	40	110 (80-149)
1999-2003	15	178 (99-293)	24	86 (55-128)
2004-2008	7	135 (54-277)	11	51 (25-91)
2008-2012	2	57 (7-205)	9	46 (21-87)

¹ Ratios have been standardised for calendar year.