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Estimates of the Prevalence of Opiate Use and/or Crack Cocaine Use, 2014/15: Sweep 11 report

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Executive summary

This report presents the findings of Sweep 11 of the estimates of the prevalence of opiate and/or crack cocaine use (OCU) in England, covering 2014/15. These continue the long time series of OCU prevalence estimates, starting in 2004/05 and most recently reported for 2011/12.

The estimated number of opiate and/or crack cocaine users (OCUs) aged 15-64 in England in 2014/15 was 300,783 (95% CI: 297,986 to 311,128). Within this group, there are an estimated 257,476 people (95% CI: 255,440 to 266,643) that use opiates and an estimated 182,828 people (95% CI: 176,675 to 190,782) that use crack cocaine.

The estimated prevalence rates for England per thousand population in 2014/15 were 8.57 (95% CI: 8.49 to 8.86) for OCU, 7.33 (95% CI: 7.28 to 7.60) for opiate use and 5.21 (95% CI: 5.03 to 5.43) for crack cocaine use.

The estimated prevalence rates for England per thousand population in each age group in 2014/15 were 4.42 (95% CI: 4.23 to 5.09) in the 15 to 24 age group, 12.36 (95% CI: 12.07 to 12.98) in the 25 to 34 age group and 8.58 (95% CI: 8.38 to 8.85) in the 35 to 64 age group. The North East region had the highest estimated rate in the 25 to 34 age group, the North West region had the highest rate in the 35 to 64 age group and London had the highest estimated rate in the 15 to 24 age group.

The estimated number of OCUs in England increased by 2% when compared to 2011/12 (293,879 to 300,783). The estimated number of opiate users increased slightly by 0.5% (256,163 to 257,476). Neither increase was statistically significant. However, there was a statistically significant increase in the estimated number of crack cocaine users of 10% between 2011/12 and 2014/15 (166,640 to 182,828).

There was an 18% increase between 2011/12 and 2014/15 in the estimated number of OCUs in the East of England, which was statistically significant. However, the highest rates for both OCU overall and opiate use continue to be in the north of England, with the North West, North East and Yorkshire and the Humber all having estimated rates of OCU above 10 per thousand population. London has the highest estimated rate of crack cocaine use in 2014/15, at 6.63 per thousand, although the point estimate fell slightly, from 6.96 per thousand in 2011/12.

The estimated number of OCUs in the 35 to 64 age group increased by 18% between 2011/12 and 2014/15 (152,127 to 178,875) while there was a 16% decrease in the estimated number aged 25 to 34 (109,124 to 91,808). Both these changes were statistically significant, and these findings follow a long-term ageing trend in the OCU population. There was a decrease of 7% in the estimated number of OCUs aged 15 to 24 between 2011/12 and 2014/15 (32,628 to 30,190), which was not statistically significant.

Report overview

Information about the prevalence of opiate and/or crack cocaine use (OCU) is an essential part of the evidence base used to formulate policy, inform service provision and assess the impact of interventions to reduce use and health harms associated with this group. Opiates are defined as: a group of drugs including heroin, methadone and buprenorphine that act on opioid receptors. Although it is not possible to directly count the number of opiate and/or crack cocaine users (OCUs) as they may not be identifiable through available administrative datasets, indirect techniques can provide estimates of prevalence. This research uses data sources that are available at the local and national level to estimate the prevalence of OCU.

Estimates are provided in the accompanying [spreadsheet](#) for the 151 upper tier local authority (LA) areas and the nine regions of England previously described as Government Office Regions. Two established prevalence estimation methods are used; the capture-recapture method and the multiple indicator method (Hay et al, 2010; Smit, van Laar and Wiessing, 2006). The national estimate for OCU was derived as the sum of the 151 LA area estimates.

These estimates for 2014/15 are the ninth set of OCU estimates to be published using this methodology and the first to be published since 2011/12. Estimates for 2012/13 and 2013/14 are in production, and once these are published there will be a time series covering eleven of the twelve years back to 2004/05 (data for 2007/08 is unavailable). Therefore, this set of estimates is also referred to as 'Sweep 11' of this series of estimates.

Data sources

Four sources of data were available within which individual OCUs, opiate users and crack cocaine users could be identified. These sources of data are drug treatment, probation, police and prison data.

Persons resident in each LA area, in contact with these sources during 2014/15, known to be using heroin, methadone, other opiate drugs, or crack cocaine were included in the analysis. Only those aged 15 to 64 were included. The overlap between data sources was determined via comparison of initials, date of birth and gender within each LA area. These identifiers were anonymised in advance of carrying out analysis. Established statistical modelling techniques were used to examine this overlap and to produce prevalence estimates stratified by age group, gender, and LA area of residence.

Methods

Two prevalence estimation methods have been used to estimate the size of the hidden drug using population at the upper tier local authority (LA) area level: the capture-recapture method and the multiple indicator method. Where available a capture-recapture estimate is used for an LA; otherwise the multiple indicator method is used. The capture-recapture method examines the overlap between different sources of data on individual drug users that are available at the local level. The multiple indicator method models the relationship between all of the available capture-recapture estimates and readily available drug indicator data. It then applies that relationship to the LAs where capture-recapture estimates are not available to provide an estimate. The LA area estimates are then summed to provide regional and national estimates.

For the 2014/15 estimates the capture-recapture method has been used to estimate the prevalence of OCU in the slight majority of LA areas in England (n=77). The multiple indicator method provided local estimates in the remaining LA areas. Further detail about the two methods can be found in the Annex at page 14.

Findings for 2014/15

England and regional estimates

Table 1 presents the national estimates and their associated 95% confidence intervals (CIs).

There were an estimated 300,783 OCUs aged 15 to 64 in England (95% CI: 297,986 to 311,128). This corresponds to 8.57 per thousand of the population (95% CI: 8.49 to 8.86). Within this group, there were an estimated 257,476 people (95% CI: 255,440 to 266,643) in England who use opiates (7.33 per thousand population aged 15 to 64, 95% CI: 7.28 to 7.60). It is estimated that 182,828 people (95% CI: 176,675 to 190,782) used crack cocaine (5.21 per thousand population aged 15 to 64, 95% CI: 5.03 to 5.43).

Table 1: National prevalence estimates and rates per 1,000 population aged 15 to 64 with 95% confidence intervals (CIs), 2014/15.

Drug	Estimate	95% CI	Rate	95% CI
Opiate and/or crack cocaine use	300,783	297,986 – 311,128	8.57	8.49 – 8.86
Opiate use	257,476	255,440 – 266,643	7.33	7.28 – 7.60
Crack cocaine use	182,828	176,675 – 190,782	5.21	5.03 – 5.43

Total estimates and estimated prevalence rates per 1,000 population for OCU, opiate use and crack cocaine use for each region are shown in Tables 2 to 4. Table 2 shows that the North West and Yorkshire and the Humber had the largest point estimate prevalence of OCU at just under 11 per thousand population aged 15 to 64 followed closely by the North East at over 10 per thousand. The South East had the lowest prevalence at around 6 per thousand.

When comparing opiate use prevalence (Table 3), the highest prevalence rates were again in Yorkshire and the Humber, the North West and North East at between 9 and 10 per thousand. Again, the South East had the lowest prevalence at just over 5 per thousand. London had the highest estimated prevalence of crack cocaine use at under 7 per thousand population (Table 4), with the North West and West Midlands close behind with a prevalence of around 6 per thousand. The prevalence rate was between around 3 and 6 per thousand in all other regions, with the North East and South East having the lowest rates at under 4 per thousand.

Table 2: Estimated number of opiate and/or crack cocaine users (OCUs) and prevalence of OCU by region, 2014/15.

Region	Number of OCUs			Rate per 1,000 population		
	Estimate	95% CI:		Estimate	95% CI:	
North East	17,675	17,116	19,120	10.44	10.11	11.30
North West	48,814	46,661	52,097	10.63	10.16	11.34
Yorkshire and the Humber	36,662	34,971	38,800	10.62	10.13	11.24
East Midlands	25,057	23,108	27,064	8.41	7.76	9.09
West Midlands	34,822	33,090	37,580	9.57	9.10	10.33
East of England	25,910	23,146	28,708	6.81	6.08	7.55
London	52,487	50,955	55,550	8.87	8.61	9.39
South East	32,734	30,175	35,974	5.80	5.35	6.38
South West	26,622	25,586	29,474	7.86	7.55	8.70
ENGLAND	300,783	297,986	311,128	8.57	8.49	8.86

Table 3: Estimated number of opiate users and prevalence of opiate use by region, 2014/15.

Region	Number of opiate users			Rate per 1,000 population		
	Estimate	95% CI:		Estimate	95% CI:	
North East	15,414	14,945	16,643	9.11	8.83	9.83
North West	42,647	41,029	45,239	9.29	8.93	9.85
Yorkshire and the Humber	32,221	30,834	34,026	9.33	8.93	9.86
East Midlands	22,163	20,635	24,262	7.44	6.93	8.15
West Midlands	30,270	28,991	32,519	8.32	7.97	8.94
East of England	21,827	20,086	23,861	5.74	5.28	6.27
London	40,750	39,407	42,995	6.89	6.66	7.27
South East	28,639	26,645	32,162	5.08	4.72	5.70
South West	23,545	22,834	25,830	6.95	6.74	7.62
ENGLAND	257,476	255,440	266,643	7.33	7.28	7.60

Table 4: Estimated number of crack cocaine users and prevalence of crack cocaine use by region, 2014/15.

Region	Number of crack cocaine users			Rate per 1,000 population		
	Estimate	95% CI:		Estimate	95% CI:	
North East	6,331	4,965	8,002	3.74	2.93	4.73
North West	28,685	25,980	31,979	6.25	5.66	6.96
Yorkshire and the Humber	19,411	17,130	21,989	5.62	4.96	6.37
East Midlands	12,331	10,451	14,255	4.14	3.51	4.79
West Midlands	21,930	19,184	24,835	6.03	5.27	6.83
East of England	17,408	14,005	20,606	4.58	3.68	5.42
London	39,226	37,364	41,940	6.63	6.32	7.09
South East	22,126	20,015	24,583	3.92	3.55	4.36
South West	15,380	13,116	17,255	4.54	3.87	5.09
ENGLAND	182,828	176,675	190,782	5.21	5.03	5.43

Age estimates

Table 5 shows the breakdown of the OCU estimates by age group and region. Table 6 shows how this breaks down by the percentage in each age group in each region, and Table 7 shows the rates in each age group and in each region.

Nationally, Table 6 shows that it is estimated that 10% of OCUs in 2014/15 were aged between 15 and 24 (n=30,190, 95% CI: 28,906 to 34,829), with just over 30% aged between 25 and 34 (n=91,808, 95% CI: 89,650 to 96,413), and just under 60% were aged between 35 and 64 (n=178,785, 95% CI: 174,685 to 184,519). Table 7 shows that the highest estimated rate was however in the 25 to 34 age group, at 12.36 per thousand population (95% Cs: 12.07 to 12.98), compared to 8.58 per thousand population in the 35 to 64 age group (95% CI: 8.38 to 8.85) and 4.42 per thousand population in the 15 to 24 age group (95% CI: 4.23 to 5.09). Regional variation is shown in Table 7: notably, the North West had a significantly higher estimated rate in the 35 to 64 age group than any other region at 12.48 per thousand population (95% CI: 11.79 to 13.29) and the North East had a significantly higher estimated rate in the 25 to 34 age group than any other region at 20.86 per thousand population (95% CI: 19.32 to 23.20). London had a significantly high rate compared to England in the 15 to 24 age group at 5.85 per thousand population (95% CI: 5.34 to 7.35); however this was not significantly higher than in other regions.

Table 5: Estimated number of opiate and/or crack cocaine users (OCUs) by age group and region.

Region	15 to 24 years			25 to 34 years			35 to 64 years		
	Estimate	95% CI:		Estimate	95% CI:		Estimate	95% CI:	
North East	1,727	1,470	2,422	6,842	6,336	7,611	9,106	8,479	9,975
North West	3,580	2,923	4,920	11,035	10,317	12,182	34,199	32,301	36,418
Yorkshire and the Humber	3,092	2,403	4,311	11,570	10,639	12,441	22,000	20,413	23,649
East Midlands	3,192	2,256	4,765	8,211	7,259	9,674	13,654	11,951	15,092
West Midlands	2,949	2,301	3,948	12,414	11,412	13,768	19,459	17,724	21,581
East of England	2,960	2,129	3,955	8,068	7,038	9,633	14,882	13,143	16,589
London	6,089	5,553	7,645	14,994	14,113	16,314	31,404	29,887	33,359
South East	4,196	3,181	5,433	10,390	9,153	12,356	18,148	16,510	20,110
South West	2,405	2,033	3,435	8,284	7,678	9,619	15,933	14,983	17,607
ENGLAND	30,190	28,906	34,829	91,808	89,650	96,413	178,785	174,685	184,519

Table 6: Estimated age group breakdown of opiate and/or crack cocaine users (OCUs) by region. (Row percentages).

Region	15 to 24 years			25 to 34 years			35 to 64 years		
	Estimate	95% CI:		Estimate	95% CI:		Estimate	95% CI:	
North East	9.77	8.23	13.34	38.71	35.87	41.40	51.52	47.81	53.97
North West	7.33	5.97	9.85	22.61	21.34	23.98	70.06	67.56	71.53
Yorkshire and the Humber	8.43	6.56	11.51	31.56	29.43	33.08	60.01	56.46	62.95
East Midlands	12.74	9.06	18.80	32.77	29.44	37.75	54.49	48.91	58.04
West Midlands	8.47	6.57	11.20	35.65	33.01	38.29	55.88	51.76	59.69
East of England	11.42	8.29	14.65	31.14	28.35	35.61	57.44	54.08	59.69
London	11.60	10.53	14.25	28.57	26.79	30.11	59.83	57.15	61.59
South East	12.82	9.82	16.07	31.74	28.44	36.04	55.44	52.18	57.97
South West	9.03	7.48	12.38	31.12	28.82	34.15	59.85	56.41	61.66
ENGLAND	10.04	9.58	11.37	30.52	29.69	31.52	59.44	57.97	59.94

Table 7: Opiate and/or crack cocaine use (OCU) prevalence rates per thousand population, by age group and region with 95% confidence intervals.

Region	15 to 24 years			25 to 34 years			35 to 64 years		
	Estimate	95% CI:		Estimate	95% CI:		Estimate	95% CI:	
North East	4.97	4.23	6.97	20.86	19.32	23.20	8.96	8.34	9.81
North West	3.89	3.18	5.35	11.84	11.07	13.07	12.48	11.79	13.29
Yorkshire and the Humber	4.29	3.33	5.97	16.71	15.37	17.97	10.80	10.02	11.60
East Midlands	5.26	3.71	7.85	14.43	12.76	17.00	7.58	6.63	8.38
West Midlands	3.93	3.07	5.26	16.80	15.44	18.63	9.06	8.25	10.04
East of England	4.19	3.02	5.60	10.66	9.30	12.72	6.36	5.61	7.09
London	5.85	5.34	7.35	8.88	8.36	9.67	9.85	9.38	10.47
South East	3.88	2.94	5.03	9.58	8.44	11.39	5.22	4.75	5.79
South West	3.63	3.07	5.19	13.04	12.08	15.14	7.62	7.16	8.42
ENGLAND	4.42	4.23	5.09	12.36	12.07	12.98	8.58	8.38	8.85

Comparisons to previous estimates

This section presents information on the differences between the 2014/15 estimates (Sweep 11) and the last set of estimates to be published, which were for 2011/12 (Sweep 8). Simulation based confidence intervals (Gemmell, Millar and Hay, 2004) were used to derive 95% CIs and where there has been a statistically significant difference between these two time periods, this has been noted by *↓ (for a decrease) or *↑ (for an increase). It should be noted that significant differences are identified when the 95% CI for the difference does not include zero, rather than comparing the confidence intervals for each year. Estimates for years prior to 2011/12 are available [here](#).

Changes in England and regional estimates

Table 8 shows the changes in the number of OCUs between 2011/12 and 2014/15 by region. Nationally, there was a 2% increase in the estimated number of OCUs, but this change was not statistically significant. The number of OCUs in the East of England increased by 18%, from 21,952 in 2011/12 to 25,910 in 2014/15, and this increase of 3,958 was statistically significant (95% CI: 270 to 7,606). There was an increase in the point estimate in the North West of 2,477 – an increase of 5% - but this was not statistically significant. All other regions saw increases in the point estimate apart from a small fall in the South East and a larger (but still not statistically significant) fall in London.

Table 8: Estimated number of opiate and/or crack cocaine users (OCUs) by region in 2011/12 (sweep 8) and 2014/15 (sweep 11).

Region	Sweep 8			Sweep 11			Difference		
	Estimate	95% CI:		Estimate	95% CI:		Estimate	95% CI:	
North East	16,935	16,467	17,762	17,675	17,116	19,120	740	-178	2,152
North West	46,337	44,529	48,643	48,814	46,661	52,097	2,477	-670	6,105
Yorkshire and the Humber	36,270	34,926	38,301	36,662	34,971	38,800	392	-2,269	2,846
East Midlands	24,085	22,134	25,947	25,057	23,108	27,064	972	-1,741	4,009
West Midlands	34,329	32,487	36,644	34,822	33,090	37,580	493	-2,268	3,840
East of England	21,952	20,103	24,379	25,910	23,146	28,708	3,958	270	7,606
London	54,985	53,831	57,864	52,487	50,955	55,550	-2,498	-5,341	634
South East	32,935	30,923	35,390	32,734	30,175	35,974	-201	-3,744	3,424
South West	26,051	25,034	27,561	26,622	25,586	29,474	571	-1,122	3,638
ENGLAND	293,879	291,029	302,146	300,783	297,986	311,128	6,904	-593	16,618

*↑

Table 9 shows the changes in the number of opiate users between 2011/12 and 2014/15 by region. There was an increase of around 0.5% in the estimated number of opiate users in England. This change was not statistically significant. The only statistically significant change in a region was a decrease in London, with a 7% fall over this period.

Table 9: Estimated number of opiate users by region in 2011/12 (sweep 8) and 2014/15 (sweep 11).

Region	Sweep 8			Sweep 11			Difference		
	Estimate	95% CI:		Estimate	95% CI:		Estimate	95% CI:	
North East	15,276	14,868	16,072	15,414	14,945	16,643	138	-679	1,347
North West	42,073	40,550	44,403	42,647	41,029	45,239	574	-2,134	3,704
Yorkshire and the Humber	32,312	30,942	34,254	32,221	30,834	34,026	-91	-2,277	2,232
East Midlands	21,465	19,749	23,155	22,163	20,635	24,262	698	-1,368	3,591
West Midlands	30,706	28,971	32,659	30,270	28,991	32,519	-436	-2,592	2,479
East of England	19,263	17,815	21,345	21,827	20,086	23,861	2,564	-40	4,987
London	43,918	42,928	46,538	40,750	39,407	42,995	-3,168	-5,974	-1,064 *↓
South East	28,068	25,831	30,521	28,639	26,645	32,162	571	-2,807	4,618
South West	23,082	22,244	24,552	23,545	22,834	25,830	463	-907	2,837
ENGLAND	256,163	253,751	263,501	257,476	255,440	266,643	1,313	-5,134	9,419

Table 10 shows the changes in the number of crack cocaine users between 2011/12 and 2014/15 by region. Nationally, there was an increase of 10% in the number of crack cocaine users over this period, and this increase was statistically significant. There was an increase of 20.5% in the South East, which was statistically significant. All other regions apart from London had increasing point estimates, but these changes were not statistically significant.

Table 10: Estimated number of crack cocaine users by region in 2011/12 (sweep 8) and 2014/15 (sweep 11).

Region	Sweep 8			Sweep 11			Difference		
	Estimate	95% CI:		Estimate	95% CI:		Estimate	95% CI:	
North East	5,544	4,600	6,563	6,331	4,965	8,002	787	-897	2,834
North West	25,361	23,219	27,578	28,685	25,980	31,979	3,324	-34	7,428
Yorkshire and the Humber	19,006	17,488	20,828	19,411	17,130	21,989	405	-2,597	3,564
East Midlands	11,687	10,119	13,532	12,331	10,451	14,255	644	-1,897	3,198
West Midlands	19,891	17,795	22,012	21,930	19,184	24,835	2,039	-1,482	5,471
East of England	13,163	10,707	15,636	17,408	14,005	20,606	4,245	-101	8,262
London	40,080	38,300	41,997	39,226	37,364	41,940	-854	-3,469	2,499
South East	18,360	15,585	21,357	22,126	20,015	24,583	3,766	77	7,399 *↑
South West	13,548	12,145	15,342	15,380	13,116	17,255	1,832	-1,261	4,033
ENGLAND	166,640	161,621	173,706	182,828	176,675	190,782	16,188	6,635	25,832 *↑

Changes in age estimates

Tables 11 to 13 show the changes in the estimated number of OCUs in each age group between 2011/12 and 2014/15.

In London, there was a statistically significant reduction of 20% in the number of OCUs in the 15 to 24 age group between 2011/12 and 2014/15. Although there was a decrease of more than 7% nationally, this was not statistically significant.

There was a statistically significant decrease of 16% nationally between 2011/12 and 2014/15 in the 25 to 34 age group, with statistically significant decreases in six of the nine regions.

Accordingly, there was a statistically significant increase of 17.5% nationally between 2011/12 and 2014/15 in the 35 to 64 age group and statistically significant increases in seven of the nine regions. These findings are likely to be related, as existing OCUs move over time from the 25 to 34 age group into the 35 to 64 age group. This represents a continuation of a longer term trend of an ageing population of OCUs.

Table 11: Estimated number of opiate and/or crack cocaine users (OCUs) aged 15 to 24 by region in 2011/12 (sweep 8) and 2014/15 (sweep 11).

Region	Sweep 8			Sweep 11			Difference		
	Estimate	95% CI:		Estimate	95% CI:		Estimate	95% CI:	
North East	2,093	1,904	2,481	1,727	1,470	2,422	-366	-844	204
North West	3,578	3,159	4,585	3,580	2,923	4,920	2	-1,313	895
Yorkshire and the Humber	2,983	2,653	3,852	3,092	2,403	4,311	109	-1,052	1,040
East Midlands	3,087	2,604	3,937	3,192	2,256	4,765	105	-1,213	1,640
West Midlands	3,369	3,003	4,105	2,949	2,301	3,948	-420	-1,381	488
East of England	2,546	2,195	3,157	2,960	2,129	3,955	414	-672	1,277
London	7,648	7,076	8,957	6,089	5,553	7,645	-1,559	-2,963	-408
South East	4,202	3,797	4,931	4,196	3,181	5,433	-6	-1,329	1,161
South West	3,123	2,482	4,365	2,405	2,033	3,435	-718	-1,850	341
ENGLAND	32,628	31,168	36,992	30,190	28,906	34,829	-2,438	-6,720	89

*↓

Table 12: Estimated number of opiate and/or crack cocaine users (OCUs) aged 25 to 34 by region in 2011/12 (sweep 8) and 2014/15 (sweep 11).

Region	Sweep 8			Sweep 11			Difference			
	Estimate	95% CI:		Estimate	95% CI:		Estimate	95% CI:		
North East	7,988	7,566	8,310	6,842	6,336	7,611	-1,146	-1,696	-197	*↓
North West	13,150	12,362	14,089	11,035	10,317	12,182	-2,115	-3,216	-741	*↓
Yorkshire and the Humber	15,298	14,464	16,136	11,570	10,639	12,441	-3,728	-4,922	-2,560	*↓
East Midlands	10,495	9,445	11,386	8,211	7,259	9,674	-2,284	-3,524	-507	*↓
West Midlands	15,686	14,671	16,812	12,414	11,412	13,768	-3,272	-4,778	-1,592	*↓
East of England	7,775	7,017	8,617	8,068	7,038	9,633	293	-1,087	2,182	
London	17,660	16,957	18,732	14,994	14,113	16,314	-2,666	-4,095	-1,309	*↓
South East	11,557	10,728	12,549	10,390	9,153	12,356	-1,167	-2,845	923	
South West	9,515	8,871	10,204	8,284	7,678	9,619	-1,231	-2,085	226	
ENGLAND	109,124	106,530	111,795	91,808	89,650	96,413	-17,316	-20,555	-11,788	*↓

Table 13: Estimated number of opiate and/or crack cocaine users (OCUs) aged 35 to 64 by region in 2011/12 (sweep 8) and 2014/15 (sweep 11).

Region	Sweep 8			Sweep 11			Difference			
	Estimate	95% CI:		Estimate	95% CI:		Estimate	95% CI:		
North East	6,854	6,546	7,265	9,106	8,479	9,975	2,252	1,522	3,154	*↑
North West	29,610	27,883	30,755	34,199	32,301	36,418	4,589	2,512	7,664	*↑
Yorkshire and the Humber	17,989	17,101	19,015	22,000	20,413	23,649	4,011	2,034	5,769	*↑
East Midlands	10,504	9,436	11,372	13,654	11,951	15,092	3,150	1,087	4,960	*↑
West Midlands	15,273	14,167	16,500	19,459	17,724	21,581	4,186	2,024	6,583	*↑
East of England	11,631	10,461	12,921	14,882	13,143	16,589	3,251	833	5,400	*↑
London	29,677	28,452	30,988	31,404	29,887	33,359	1,727	-100	4,017	
South East	17,176	15,950	18,479	18,148	16,510	20,110	972	-1,133	3,244	
South West	13,413	12,620	14,245	15,933	14,983	17,607	2,520	1,268	4,426	*↑
ENGLAND	152,127	148,576	155,156	178,785	174,685	184,519	26,658	21,576	33,419	*↑

Annex – Technical notes

Overall method

This research applies two established methods, the capture-recapture method (Hay et al, 2010) and the multiple indicator method, which is also known as the multivariate indicator method or MIM, (Smit, van Laar and Wiessing, 2006) to estimate the prevalence of opiate and/or crack cocaine use in England in 2014/15. The benefits of these methods are that: they do not rely exclusively on drug users self-reported use of substances; it is possible to provide estimates of prevalence stratified by key characteristics such as age and gender; they use a standard set of procedures that are tried and tested and allow for replication; they build upon existing routinely collected data. This annex provides a brief overview of the methods. More details of these methods and the implications for their use can be found in the report of the first two sweeps of this project (Hay et al, 2006; Hay et al, 2007a) and in a technical report (Hay et al, 2007b).

As with previous sweeps of the project, the first stage of the estimation process was to attempt to obtain capture-recapture (CRC) estimates for all LA areas. These CRC estimates were then used as anchor points for a multiple indicator method (MIM) model which was used to provide estimates for those areas for which it had not proved possible to obtain a CRC estimate.

The capture-recapture analysis procedure

In simple terms, the capture-recapture analysis involves testing a series of statistical formulae, or 'models', to find one that best matches, or 'fits' the pattern of overlap between data sources. A value, known as the Akaike Information Criterion (AIC) (Hook and Regal, 1997), can be useful in gauging goodness of fit. This model is then used to calculate the number of opiate and/or crack cocaine users who do not appear in any source. This estimate is then added to the total number of known opiate and/or crack cocaine users, to provide an overall estimate of prevalence.

The first stage of analysis involved testing how well a simple model that assumed all samples were independent of each other described the observed overlap pattern across the four samples. Increasingly complex models, representing dependencies between single pairs of data sources ('one-way') and then two pairs of sources ('two-way') were then tested. The model that best matched the overlap was chosen using objective statistical criteria; more complex models were only chosen if they provided a better match (on comparing AIC values) than lower-level models. All capture-recapture analyses were carried out using the GLIM4 statistical package.

In most LA areas, all four sources of data were available to estimate the prevalence of opiate and/or crack cocaine use and opiate use. Attempts were made to produce capture-recapture estimates in all areas but in the two smallest LA areas there were too few data to carry out any meaningful analyses (City of London and Rutland). Also for consistency with previous years the estimates for the newer local authorities of Bedford, Central Bedfordshire, Cheshire East and also Cheshire West and Chester were first derived at the previous upper tier level (Bedfordshire and Cheshire) then disaggregated to the new upper tier level.

Within this first stage of the analysis, models were fitted in turn with a view to acquiring capture re-capture estimates for each area which, when summed, would ensure that the national confidence interval was as narrow as possible. To do this, the 22 simplest models were applied to the overlap data from each area. This was initially carried out on unstratified data, i.e. not split by gender or age group. This process was then repeated for the data stratified by age group (three strata) and by gender (two strata) giving five stratified estimates. At this stage the data were not stratified by both the age group and gender (e.g. young males, females aged 35 to 64). Such an approach to stratification would have given another six stratified estimates.

Various methods were used to explore whether the model fitted to the unstratified data was a good fit (in particular if the AIC value was less than zero) and whether the resultant estimate was valid. This included checking whether the lowest deviance value indicated a good fit (a lower deviance value signifies a better fit of the model to the observed data), checking whether the estimate derived from applying the best model was similar to a weighted estimate (calculated as a weighted mean of the available 22 estimates) and whether the unstratified estimate was similar to the sum of the stratified estimate for both the age-stratified and gender-stratified model / estimates. In addition, the credibility of each estimate was considered (i.e. not unfeasibly low or high in comparison with the known drug using population or underlying general population).

Thus to summarise, if the model fitted to the unstratified data did not offer a valid estimate, then either the summed gender-specific or age group-specific estimates were considered (with gender-specific estimates preferred if there was no discernible difference between the two approaches; again to ensure that the national confidence interval was not excessively wide). If the models fitted at this stage again did not offer a valid estimate then the approach taken was to stratify the males into three age groups but keep the female data unstratified. This was particularly important, as, across the country, there were few data on female opiate and/or crack cocaine users over the age of 34. If that approach did not work, then the analyses were run on the six age and gender strata and those estimates were considered. If none of those unstratified estimates were deemed appropriate then any stratified analysis where the AIC value for one stratum was less than five was considered. If none of those approaches provided a valid estimate then a multiple indicator estimate was used instead.

Once the OCU and opiate use capture-recapture estimates for each case definition were obtained, they were compared against each other at the LA area level and aligned where necessary (e.g. to ensure that the OCU estimate is the greater of the two). As with the previous sweeps, estimates stratified by age group were obtained by first estimating the proportion of drug users falling in each stratum in each LA area, then applying these estimated proportions to the total prevalence estimates for that area, whether it was obtained using capture-recapture method or the multiple indicator method.

A simplified version of the approach described above was carried out to estimate the prevalence of crack cocaine use at the LA area level. However, in this case analyses were not stratified by age group or gender and estimates by age group are not produced.

Case definitions

The case definition of the prevalence estimates depends heavily on the case definitions used by the contributing sources. Moreover, the case definitions of the resultant prevalence estimates need to reflect case definitions that are common across all data sources. The study therefore employed the following as the case definition:

- Use of opiates and/or the use of crack cocaine.

It should be noted that the case definition focuses on the 'use' of opiates and/or crack cocaine rather than the 'misuse' of these drugs or addiction to either drug. The case definition does not include the use of cocaine in a powder form or the use of any other substances such as amphetamine, ecstasy or cannabis.

The study also provides separate estimates of the prevalence of opiate use, and of the prevalence of crack cocaine use.

All data refer to the financial year from 1st April 2014 to 31st March 2015. The age range employed within the study is from 15 to 64 and where the estimates have been stratified by age group, these are 15 to 24, 25 to 34 and 35 to 64 years of age. To derive age from date of birth, the individual's age on the 1st of October 2014 (the mid-point in the financial year 2014/15) was calculated and those who were under the age of 15 or over the age of 64 were excluded. Individuals with missing data fields, such as gender, forename initial or surname initial were also excluded, as were individuals where it was not possible to assign LA area of residence (or those that were resident outside England).

Due to the case definitions outlined above and the confidence intervals associated with each estimate the figures must be used with care. More information on the how the estimates can be used and the limitations associated with them can be found in Man (2007)¹.

¹ http://www.nta.nhs.uk/uploads/guidance_using_pdu_estimates.pdf

Data

Data used in the capture-recapture analyses

Four main sources of data on opiate and/or crack cocaine use, which were suitable for use in the capture-recapture analyses, were available at the national level:

- The National Drug Treatment Monitoring System (NDTMS) – this collects data on both community and prison treatment, which are regarded as two separate data sources (and are routinely reported as such); a person is included if they indicated opiate and/or crack cocaine use among their problematic substances
- The National Probation Service assessments where opiate and/or crack cocaine use was indicated
- Drug users convicted under the Misuse of Drugs Act (1971) for offences involving possession (or possession with intent to supply) heroin, methadone and/or crack cocaine from the Police National Computer (PNC)

Data sources used in the multiple indicator analyses

There is a wide range of indicator data that may be correlated with drug use prevalence at the LA area level that could be useful within a multiple indicator analysis. Three main types of indicator data could be used within this type of analysis; data that are currently in the public domain (e.g. published data on crime or income support claimants), data that are not currently in the public domain but could have been provided to the study team (e.g. drug-related hospital admissions) and data that have been collected for use within the capture-recapture analyses (such as the NDTMS data).

As in the previous sweeps of the study, a decision was made not to use crime data as these data referred to the place where the crime was committed, not the place where the person responsible for the crime lived. Therefore such indicator data could artificially inflate the estimates for some places where crimes are committed by people who do not live there (e.g. Westminster). Population density was used as an indicator in sweeps one, two and three but has not been used in later sweeps. In previous sweeps, the use of data that were not in the public domain did not appear to improve the analyses. Therefore, the data used in the multiple indicator method analyses were the same as those used in the capture-recapture analyses.

Multiple indicator analyses

In this section, the specific application of the multiple indicator method within this sweep of the study is considered. All of the indicator data and the anchor point data were converted to rates per 1,000 population aged 15 to 64 prior to inclusion in the analyses.

The capture-recapture analyses derived estimates of the prevalence of different types of problem drug use (opiate and/or crack cocaine use; opiate use; crack cocaine use). From these estimates a set of anchor point LA areas were constructed for use within the multiple indicator analyses. Overall there were 77 LA areas that were used as anchor points in the final multiple indicator analyses, although other provisional multiple indicator analyses were carried out to examine the credibility of the capture-recapture estimates and their use in a multiple indicator model.

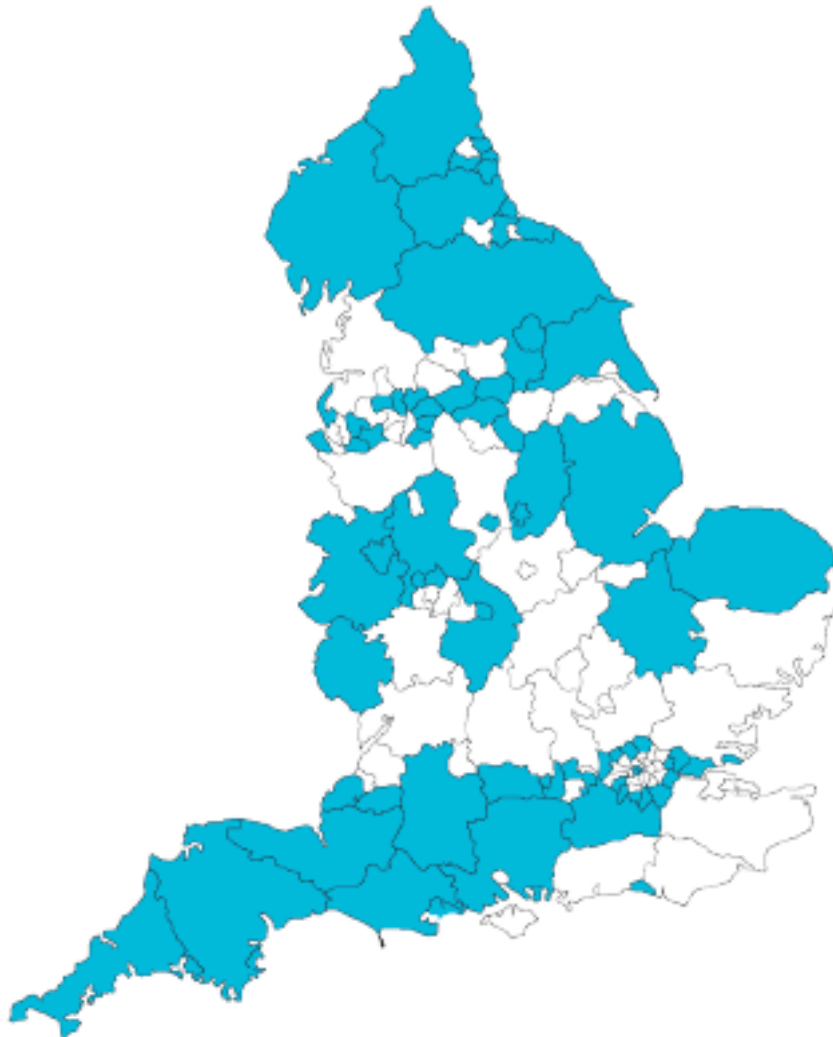
The number of LA areas that were used as multiple indicator anchor points is summarised by region in Table A1.

Table A1: Summary of the number of local authority (LA) areas used as multiple indicator anchor points by region.

Region	Number of LA Areas	OCU	Opiate	Crack cocaine
North East	12	9	9	4
North West	23	12	11	13
Yorkshire and the Humber	15	7	7	7
East Midlands	9	4	4	5
West Midlands	14	8	11	8
East of England	11	4	5	7
London	33	14	12	18
South East	19	8	11	10
South West	15	11	12	7
ENGLAND	151	77	82	79

The LA areas that were used as anchor points in the OCU multiple indicator analyses are shown as the darker shaded areas in Figure A1 (map).

Figure A1: Map showing the opiate and/or crack cocaine use (OCU) anchor point areas (darker shaded areas).



With 77 anchor points available there was no need to use a technique known as principal component analyses that multiple indicator studies often use to ensure that the number of indicators is effectively less than the number of available anchor points (a prerequisite of the regression analysis). Instead, the stepwise regression method (simple linear multiple regression with normal errors) in Minitab 18.1 was used. For each different drug definition only one multiple indicator model was constructed for the whole of England and region was not included as a categorical indicator.

The stepwise regression approach considers all available indicators and only includes a particular indicator in the final regression model if it is significantly related to the available prevalence estimates. The stepwise regression approach alternates at each step between adding significant or deleting non-significant indicators² and can result in models that offer a good fit to the available data with a minimal number of indicators. This is in contrast to the forward selection approach which starts with no indicators in the model and keeps including indicators until there are no more significant indicators, and the backward elimination approach which starts with all indicators in the model and removes non-significant ones until all remaining ones are significantly related to the available prevalence estimates. The stepwise regression approach resulted in the following indicators remaining in the best regression model (in order of significance starting with the most significant indicator):

- NDTMS
- Prison

This model explained 88% of the variance (i.e. provided a good fit to the available data) with the first indicator (NDTMS) explaining 85% of the variance.

Analysis: prevalence of opiate use and crack cocaine use

The general approach outlined above for opiate and/or crack cocaine use was also taken to estimate the prevalence of opiate use or crack cocaine use. The stepwise regression approach resulted in the following indicators remaining in the best regression models (in descending order of significance) for each definition;

Opiate use:

- NDTMS
- Prison

Crack cocaine use:

- NDTMS
- Prison

For the opiate use analyses, the indicators explained 92% of the variance (69% for crack cocaine).

As described in the Sweep 2 Technical Report (Hay et al. 2007b), comparisons between the opiate use and crack cocaine use and the opiate and/or crack cocaine use estimates were made to gauge the validity of the different estimates. Capture-recapture estimates for each definition were compared with multiple indicator estimates. The impact of including capture-recapture estimates that unduly influenced the multiple indicator model was also considered. This 'consistency checking' will always have some element of subjectivity in it due to the issue of having to have consistency of estimates derived from two different methods across three case definitions.

² In these analyses α to enter and α to remove were both set to 0.15

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