

Estimating the cohabiting population

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Introduction

Population estimates by legal marital status are produced annually for England and Wales¹. Cohabitation population estimates are produced less frequently (cohabitation here refers to de facto marital status for opposite-sex co-residential cohabiting adults aged 16 and over)², and the last set of cohabitation estimates were produced for mid-2003³. Before that, estimates were produced for mid-1996 and mid-1992⁴.

One of the main uses for cohabitation estimates is to help prepare projections of the population by marital status (in this case, the 2006-based marital status projections). These include projections of the population that will be cohabiting in the future. Estimates of the cohabiting population are required by many users (such as government departments and academics) to understand existing population characteristics and explore how these characteristics change over time.

This article describes the mid-2007 cohabitation estimates, beginning with the methodology, which has been updated since the last cohabitation estimates were prepared. The availability of new APS (Annual Population Survey) household data provides a more robust sample than was previously available to check and adjust the estimates⁵. The second section of this article explores the results, including a comparison with previous estimates. Possible interpretations are discussed, as well as the implications for projections of the cohabiting population.

Variables and data sources

Cohabitation estimates seek to expand the categories available for legal (*de jure*) marital status to include cohabitation. Legal marital status typically includes the following categories:

This article summarises mid-2007 cohabitation estimates produced for England and Wales and compares these with estimates made for previous years. Over the last fifteen years there has been a rise in the number of cohabiting adults in England and Wales. Previous estimates indicate that there were 2.7 million cohabiting adults in 1992 (6 per cent of the population over 16-years-old). In 2007 it is estimated that the number of cohabiting adults had increased to 4.5 million (10 per cent of the population over 16-years-old). Cohabitation trends provide evidence to suggest that cohabitation will continue to rise for never married adults (and therefore overall), particularly at older ages. There is also evidence suggesting an end to historic increases in cohabitation levels for never married adults under 30-years-old.

Box one

Summary of the method

The method used here is based upon that used to create the mid-2003 cohabitation estimates¹. Estimates of the number of people cohabiting are derived from the most robust survey data available. In order to ensure consistency between the cohabitation estimates and other population estimates, there are a number of stages in the method. These are:

- (A) Estimate the total population cohabiting and not cohabiting by sex
- (B) Allocate the total populations to legal marital status categories
- (C) Adjust the estimates to satisfy four constraints:
 1. the number of men cohabiting equals the number of women cohabiting
 2. the number of men and women cohabiting plus those not cohabiting equals the number of men and women in the population
 3. the number of men and women by de facto marital status must be consistent with the legal marital status population estimates by sex
 4. the number of separated (but still legally married) men equals the number of separated (but still legally married) women
- (D) Allocate the estimates to single years of age
- (E) Divide the married population into the categories of: married (and living with spouse), and separated (living apart from spouse, but still legally married).

- single (never married)
- married (and living with spouse)
- separated (living apart from spouse, but still legally married)⁶
- divorced
- widowed

Cohabitation estimates expand these categories to include people's actual living status (whether or not they are co-residentially cohabiting). In simple terms, a person (in each legal status) can be categorised as either cohabiting or not. For example, some people will be divorced and cohabiting, and some will be divorced and not cohabiting. The same is true for all categories except that, unless he or she is separated, a married person cannot be married and cohabiting.

This research uses three nationally representative surveys: the GHS (General Household Survey), the LFS (Labour Force Survey) and the APS (Annual Population Survey)⁷. In addition, the 2001 Census is used to assist the allocation of estimates to single years of age. All of these sources provide estimates of the cohabiting population under the detailed marital status categories described above. Each source varies according to its coverage and timeliness. However, by combining the best qualities of each data source, it is possible to create cohabitation estimates for 2007 by sex and single year of age (in respect of opposite-sex co-residential cohabiting adults aged 16 and over)⁸. Finally, in order to produce estimates of the population not-cohabiting (and ensure consistency with official estimates of the population by legal marital status), the method uses the recently published revised mid-2007 population estimates by legal marital status. These revised marital status estimates have been adjusted to account for the effects of marriages abroad and non-resident marriages⁹.

Estimating the total cohabiting population

In addition to the surveys used for previous cohabitation estimates (GHS and LFS), there is a new data source available. The APS household dataset has the largest sample size of any nationally representative survey that is suitable for making cohabitation estimates. In addition, whereas LFS household data are only available for two quarters of the year, APS data are available for the annual period January to December. This makes the APS a more appropriate source for mid-year population estimates than the LFS. Previous methods used GHS and LFS data to estimate the total cohabiting population. For the mid-2007 estimates, it was decided to use the APS as well. The 2001 Census was not used for this stage of the analysis because it is not as timely as the other sources.

In previous methods, the first stage was to decide the lowest level of detail where there was good agreement between data sources for the numbers of men and women who were cohabiting. The same investigation was carried out here, looking at the following levels of detail:

- (i) by sex
- (ii) by sex and marital status
- (iii) by sex, marital status and five-year age groups

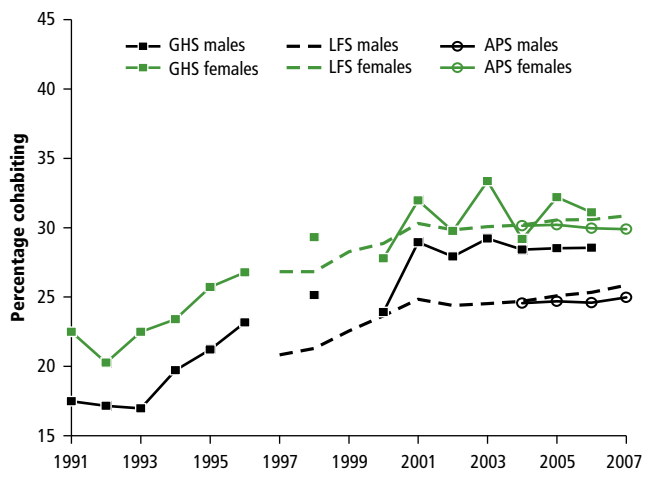
As with previous investigations, it was found that there was only good agreement between sources at the first level (i) by sex. Estimates of the number of cohabiting women are shown in **Table 1**. There is good agreement between sources at the overall level for 2007, with 2.29 million cohabiting couples according to LFS, 2.24 million according to APS, and 2.20 million according to GHS. However, after disaggregating these figures by marital status, the difference between sources becomes larger. This is particularly true for the marital statuses with smaller populations (where the sample size is also smaller). Survey estimates by

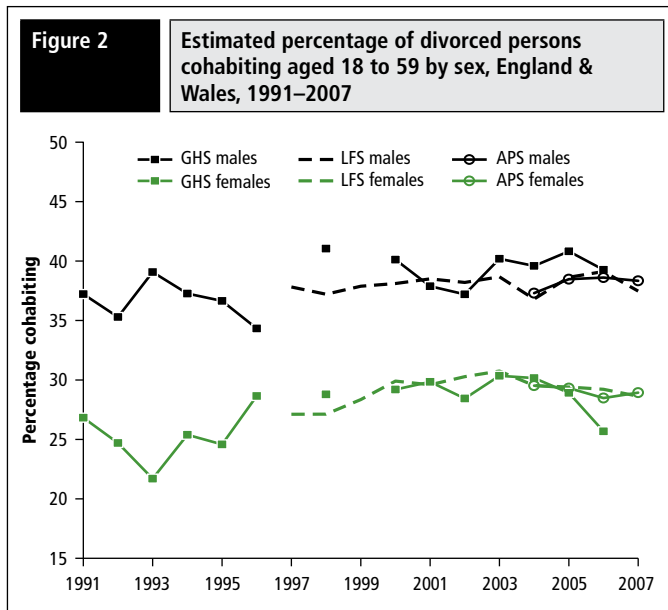
Table 1 Survey estimates of the cohabiting¹ female² population aged 16 and over, England and Wales, thousands

	LFS	APS	GHS
2006	2,212	2,199	2,168
2007	2,288	2,238	2,203

1 Excluding same-sex cohabitation
 2 The estimated male population is the same for all years and sources
 Source: LFS, APS, GHS

Figure 1 Estimated percentage of never married persons cohabiting aged 18 to 59 by sex, England & Wales, 1991–2007





sex, marital status and five-year age groups show even larger differences (between sources).

Figure 1 shows cohabitation estimates from the survey sources for never married adults (aged 18 to 59). Figure 2 shows the equivalent for divorced adults. Not only do these charts show the variation between sources by marital status, but they also indicate that in recent years the proportion of never married adults that are cohabiting has increased, whereas the proportion of divorced adults that are cohabiting exhibits a broadly stable trend (despite fluctuations between years). For the other marital status categories (separated and widowed), trends in the proportion cohabiting are also broadly stable over time (i.e. similar to those shown for the divorced in Figure 2)¹⁰. For this reason, in addition

to the fact that the majority of cohabitants are never married, there was an increased focus on the never married population when exploring the mid-2007 results and comparing with previous years (see the analysis later in this article).

Considering the survey estimates (shown in Table 1), it was decided to use an estimate of 4.5 million for the number of cohabiting adults in England and Wales in 2007 (2.25 million men and 2.25 million women). This figure is close to the average (mean) of all three sources (4.49 million adults). It is rounded to avoid giving the impression that it is based on an exact count, and because survey estimates are subject to a margin of uncertainty.

Allocating the total population to marital status categories

The next stage of the method is to allocate the total cohabiting population into marital status categories. That is, to disaggregate the total number of cohabiting men and women into the four categories of: single, separated, widowed and divorced. The totals are allocated using an average of GHS and APS data (similar to previous methods)¹¹. From this point onwards, it was decided to use the APS instead of the LFS in order to avoid issues relating to any overlap between APS and LFS¹². Taking an average of GHS and APS is seen as appropriate given the difference between sources (although the results were similar enough not to raise any overall concern). The results of the allocation produced initial estimates of the cohabiting population by marital status. These results were then used to create initial estimates of the population not cohabiting by marital status. All initial estimates are shown in Table 2.

Adjusting the estimates to satisfy constraints

Comparing the initial estimates with the published 2007 legal marital status estimates shows a discrepancy between the total population by sex and marital status. The results are therefore adjusted so that this is

Table 2 Initial and constrained 2007 estimates for males and females in England and Wales (thousands)

	Age	Males					Total Males
		Single	Married	Separated	Divorced	Widowed	
Cohabiting							
Initial estimates	16+	1,672	-	68	473	37	2,250
Constrained estimates	16+	1,619	-	68	531	32	2,250
Not cohabiting							
Initial estimates	16+	5,959	11,108	352	953	716	19,088
Constrained estimates	16+	6,430	10,392	391	1,192	683	19,088
Total							
Initial estimates	16+	7,631	11,108	420	1,426	754	21,338
Constrained estimates	16+	8,049	10,392	459	1,723	715	21,338
	Age	Females					Total Females
		Single	Married	Separated	Divorced	Widowed	
Cohabiting							
Initial estimates	16+	1,669	-	60	467	53	2,250
Constrained estimates	16+	1,672	-	45	481	53	2,250
Not cohabiting							
Initial estimates	16+	4,755	11,112	513	1,610	2,280	20,271
Constrained estimates	16+	5,200	10,392	414	1,808	2,457	20,271
Total							
Initial estimates	16+	6,424	11,112	573	2,078	2,334	22,521
Constrained estimates	16+	6,872	10,392	459	2,289	2,510	22,521

no longer the case¹³. A second adjustment is made to ensure that the number of separated (but still legally married) men equals the number of separated (but still legally married) women¹⁴. These adjustments result in constrained estimates of the population cohabiting and not cohabiting by marital status and sex. These estimates are given alongside the initial estimates in Table 2.

Allocating the estimates to single years of age

In order to arrive at cohabitation estimates by single year of age, the final estimates are first allocated to five-year age groups. This is done using APS proportions and checked using GHS¹⁵. There is close agreement between GHS and the allocated final estimates (apart from age groups where the GHS sample size becomes very small). To allocate the estimates from five-year age groups to single years of age, a Beers interpolation method is used along with 2001 Census data (the most accurate data available by single years of age)¹⁶. The method ensures that the five-year age group totals are preserved, and gives final estimates for the cohabiting population by sex, marital status, and single year of age.

These final cohabitation estimates are then used to derive the corresponding number of people not cohabiting. The numbers cohabiting are subtracted from the total marital status population in each age group using the 2007 legal marital status estimates (adjusted for marriages abroad – see *Variables and data sources*)¹⁷.

The separated population

Legal marital status estimates do not distinguish the separated population (which is included in the total married population). To account for this, both the separated cohabiting and non-cohabiting populations for single years of age are calculated using the (Beers interpolation) method mentioned above¹⁸. By subtracting these from the total married population, as given by the legal marital status estimates, an estimate is derived of the number of ‘married and living with spouse’ men and women by single year of age. As such, the legally married population (by sex and age) is allocated to one of three statuses: married and living with spouse, separated and cohabiting, or separated and not-cohabiting.

Results

Having followed the methodology described above, final 2007 estimates of de facto partnership status are available by single year of age and sex.

In order to check their accuracy they are then quality assured, and one of these quality checks includes a comparison with estimates for previous years¹⁹. For reasons mentioned previously, and because they represent the majority of cohabiting adults, quality checks focused largely on the never married. **Figure 3** shows a comparison of the number of single (never married) men and women cohabiting in each year for which estimates exist (by single year of age). **Figure 4** shows a similar comparison for the proportion of never married women that are cohabiting.

It is clear that both the number and proportion of never married adults that are cohabiting has increased between 1992 and 2007. However, when comparing 2003 and 2007, the largest increases in the proportion of never married adults cohabiting have been for those aged over 30. This shows that increases in the number of cohabiting never married adults under 30-years-old are driven by increases in the total never married population (cohabiting and not cohabiting). Compared with previous years, the 2007 results show both plausible and (relatively) smooth results.

Further interpretation of the results for never married adults

Having established that the 2007 results are realistic, it appears that rises in the proportion of never married adults cohabiting are slowing over time for young adults under 30-years-old. It is at older ages that the proportion of never married adults cohabiting continues to increase. There is much debate about recent declines in marriage rates, and whether cohabitation is more often a prelude to or a substitute for marriage. In any case, it seems that never married cohabitation is rising for adults aged over 30 because older generations are ageing and being replaced by generations who are more likely to cohabit. **Figure 5** shows this generation (or cohort) effect, and is based on the same data as Figure 4. However, for each year’s results, the proportion cohabiting is analysed by year of birth rather than age. For example, for those born in 1951, the charts show the proportions cohabiting in 1992 (at age 41), in 1996 (at age 45), in 2003 (at age 52) and in 2007 (at age 56).

From Figure 4, it is clear that the proportion cohabiting rises at younger ages until reaching a peak around age 30. One of the clearest conclusions of Figure 5 is that, from a certain age, the proportion of never-married people cohabiting has remained almost constant as the particular cohort ages. In other words, beyond a certain age, the proportion of never-married people cohabiting aged x in year y is very similar to the

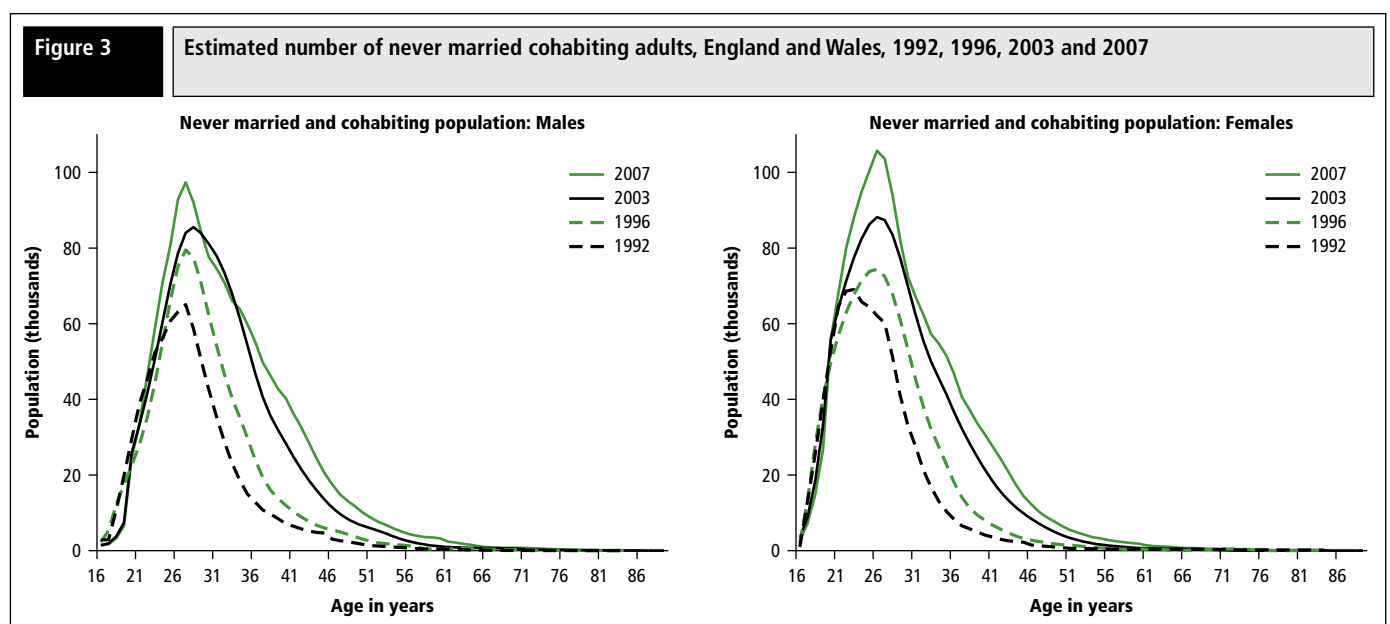


Figure 4 Estimated percentage of never married adults cohabiting by age, in England and Wales, 1992, 1996, 2003 and 2007

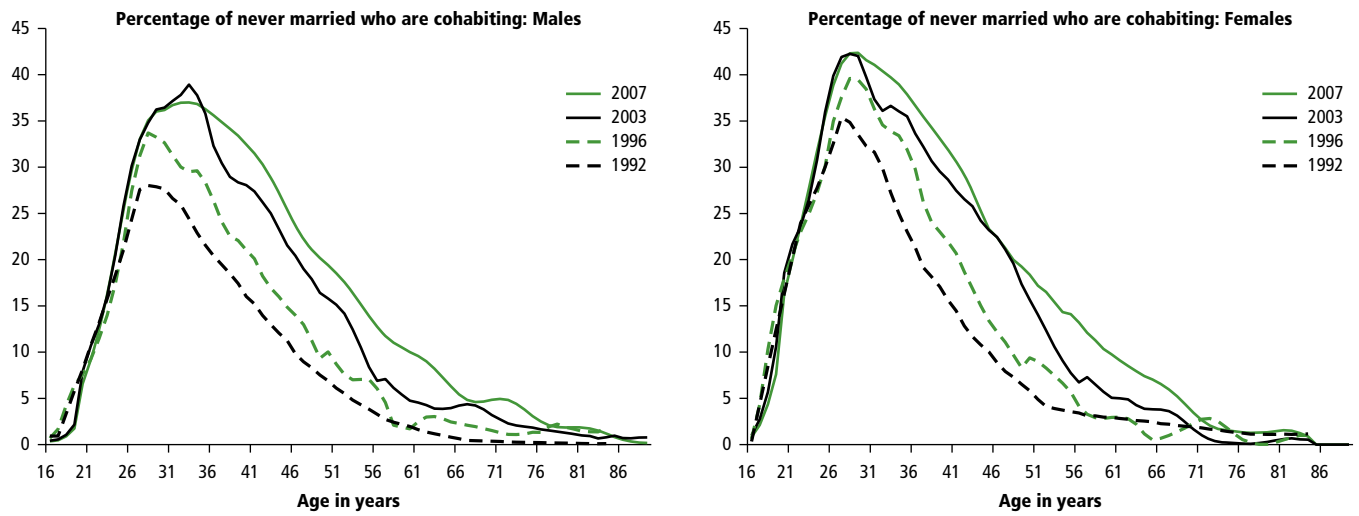
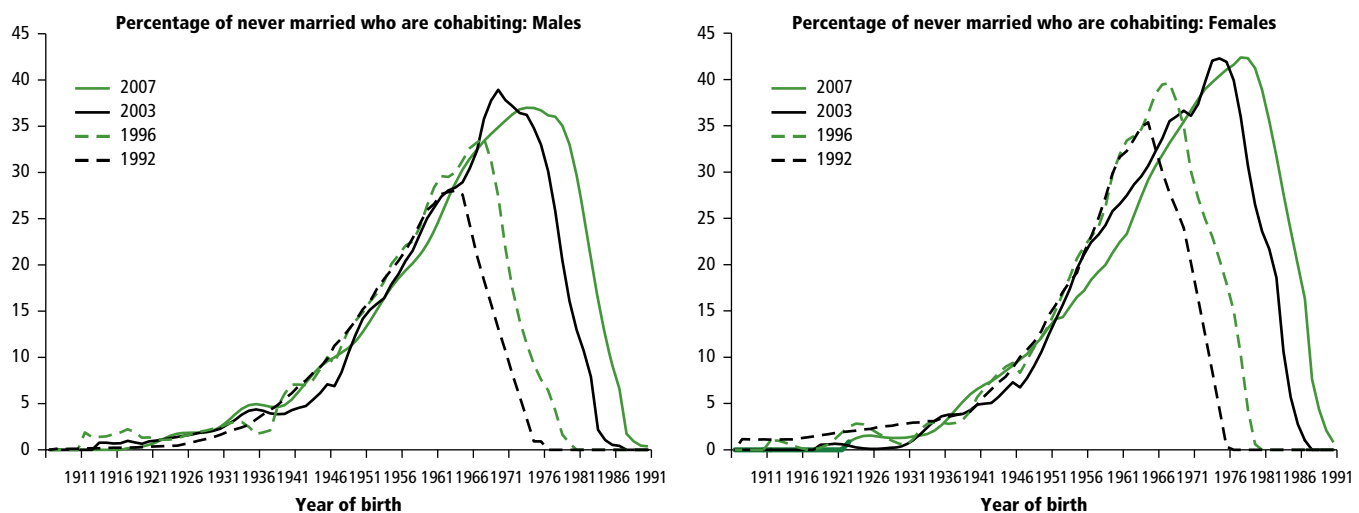


Figure 5 Percentage of never married adults cohabiting by birth cohort in England and Wales, 1992, 1996, 2003, 2007



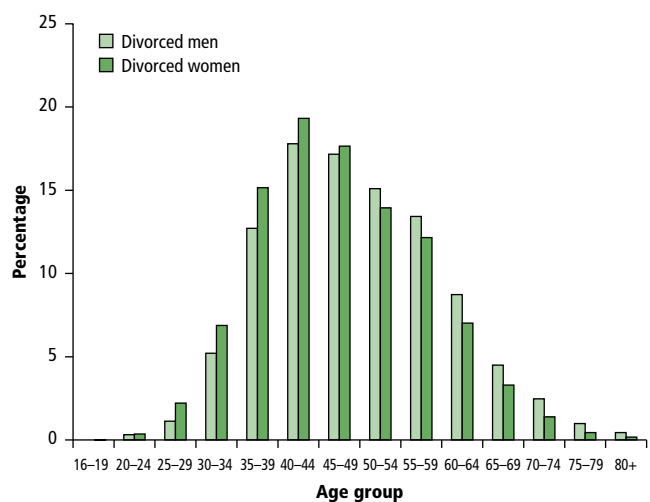
proportion cohabiting aged $x + t$ in year $y + t$. Despite there being 15 years between 1992 and 2007, the proportion of never married adults that are cohabiting has remained stable (across the four sets of estimates) for women born prior to 1950. This *cohort stability* is even more noticeable for men, where it is seen for all those born before 1965.

Other marital statuses

As shown in Table 2, the majority (73 per cent) of cohabiting adults are never married. Most of the remainder (23 per cent) are divorced. **Figure 6** shows the age distribution of the divorced cohabiting population for males and females. For example, 19 per cent of all divorced women who are cohabiting are aged between 40 and 44-years-old. On average, cohabiting divorced men tend to be older than cohabiting divorced women, but, as expected, the largest proportions are at the ages where the divorced population is also largest.

The proportions of adults cohabiting also vary by marital status, and this is in part due to the different age profiles of the population in each marital status (and the fact that cohabitation is more likely at younger ages). Although 24 per cent of never married women are cohabiting, the

Figure 6 Percentage of divorced cohabitants in each age group



equivalent figures for other marital statuses are 10 per cent (separated), 21 per cent (divorced) and 2 per cent (widowed). For men the proportions cohabiting are 20 per cent (never married), 15 per cent (separated), 31 per cent (divorced) and 5 per cent (widowed). It is therefore more likely that divorced men are cohabiting compared with never married men.

Conclusion

In 2007, it is estimated that 4.5 million adults were cohabiting, 10 per cent of the population aged over 16-years-old. The majority of cohabiting adults (73 per cent) have never married, while most of the remainder are divorced (23 per cent). The age profiles of cohabiting adults vary according to marital status. Never married cohabitants tend to be under 30 and divorced cohabitants more likely to be over 35. Separated cohabitants tend (on average) to be younger than divorced cohabitants by a few years, although the profiles are similar, with most separated and divorced cohabitants aged between 30 and 65. The overall age profile of cohabitants (Table 3) shows that cohabiting women tend to be younger than cohabiting men. In 2007, 45 per cent of cohabiting women were aged between 16 and 30, compared with 35 per cent of cohabiting men. Despite the fact that cohabitants tend to be younger than adults not cohabiting, 5 per cent of cohabiting men and 4 per cent of cohabiting women are over 60-years-old.

Overall, the patterns of cohabitation and recent trends are similar for men and women, and this is reinforced by the results in Table 4, which shows the percentage of the total population who were cohabiting in 1992 and 2007 (by age group and sex). There has been an increase in the proportion cohabiting for all age groups²⁰, confirming what was shown previously in Figure 4 and Figure 5 for the never married. Given that the estimates prepared here will feed into the cohabitation element of the 2006-based marital status projections (see the Marital Status Projections report in this issue of Population Trends), it is worth briefly considering whether these proportions are likely to continue increasing in the future.

The analysis of cohorts (generations) shown in Figure 5 suggests that, from a certain age (i.e. for those who are older), the proportion of never-married people cohabiting remains almost constant (for each cohort) as the particular cohort ages. For those who are younger (under

Age	Men		Women	
	1992	2007	1992	2007
16 to 30	50	35	60	45
31 to 45	35	42	29	37
46 to 60	11	17	8	14
Over 60	4	5	3	4
Total	100	100	100	100

Source: ONS Cohabitation estimates, 1992 and 2007

Age	Men		Women	
	1992	2007	1992	2007
16 to 30	10	14	12	19
31 to 45	8	16	7	14
46 to 60	3	8	3	6
Over 60	1	3	1	1

Source: ONS Cohabitation estimates, 1992 and 2007

Key findings

- In 2007, it is estimated that 4.5 million adults were cohabiting, 10 per cent of the population over 16-years-old
- The majority of cohabiting adults (73 per cent) have never married. Around 24 per cent of never married women are cohabiting compared with 20 per cent of never married men
- Although there are more never married cohabiting men than divorced cohabiting men, the proportion of divorced men that are cohabiting is larger, 31 per cent (divorced) compared with 20 per cent (never married)
- In 1992, 12 per cent of women aged 16 to 30 were cohabiting compared with 10 per cent of men. By 2007, these figures had risen to 19 per cent for women and 14 per cent for men. In fact, there was a rise in all other age groups (for both men and women)
- Cohabitation trends provide evidence to suggest that cohabitation will continue to rise for never married adults (and therefore overall), particularly at older ages. There is also evidence suggesting an end to historic increases in cohabitation levels for never married adults under 30-years-old.

30-years-old), never-married cohabitation levels have been increasing until very recently. Figure 4 provides evidence to suggest that this increase may not continue (for those under 30-years-old). However, if the younger cohorts maintain their cohabitation propensities (established as young adults) throughout the rest of their lives, in the same way that has been seen for older cohorts, then the proportion cohabiting at older ages (and overall) will continue to rise.

Any questions or comments on this article (or the cohabitation projections) are welcomed. Please contact ben.wilson@ons.gov.uk.

Note

To access the final estimates discussed in this article, please download the 2006-based principal cohabitation projection using the link below. Projections can also be downloaded via this link, including additional information on all aspects of the marital status projections, the cohabitation projections, assumptions and variants. www.statistics.gov.uk/downloads/theme_population/MaritalStatusProjection06.pdf

Acknowledgements

I am grateful to all those who commented on this article, and to those who helped with development of the methodology used to create the estimates, in particular Steve Smallwood and Chris Shaw.

References

- 1 Population estimates by legal marital status for England and Wales are produced by the Office for National Statistics (ONS). Population estimates by legal marital status for Scotland are produced by the General Register Office for Scotland (GROS). Population estimates by legal marital status are not currently produced for Northern Ireland.
- 2 At present, estimates of the cohabiting population do not include people in same-sex cohabiting couples or civil partners. These population sub-groups are currently included in the population 'not cohabiting' and are not separately identified. The main reason for this is that these populations are difficult to estimate accurately, particularly at the level of detail required by the current methodology. Any estimate will also be affected by response errors; for example, surveys such as the Labour Force Survey and Annual Population Survey only collect information spontaneously volunteered by

- same-sex couples. It is therefore the case that same-sex cohabiting couples and civil partners (although not separately identified) will be included in one of the following population categories: single and not cohabiting, separated and not cohabiting, divorced and not cohabiting, or widowed and not cohabiting. The category will depend upon their legal marital status, without consideration of any legal marital status relating to civil partnership.
- 3 See: Cohabitation population estimates for England and Wales, 2003 www.statistics.gov.uk/downloads/theme_population/PT119v2.pdf and www.statistics.gov.uk/StatBase/Product.asp?vlnk=13607&Pos=&ColRank=1&Rank=272
 - 4 Shaw C and Haskey J (1999) 'New estimates and projections of the population cohabiting in England and Wales', *Population Trends* 95, pp 7–17. www.statistics.gov.uk/cci/article.asp?ID=613
 - 5 The Annual Population Survey (APS) household data set comes from the Labour Force Survey (LFS) and the APS (person) data set. The former is a quarterly survey of households living at private addresses in the UK. The latter is created by combining individuals in waves one and five from four consecutive LFS quarters with the English, Welsh and Scottish Local Labour Force Surveys. The APS household data sets therefore contain results from four different sources. They cover the period January to December for individual years from 2004.
 - 6 Legal marital status estimates do not distinguish the separated population (which is included in the total married population). For more information see the later section of the article titled 'The separated population'
 - 7 Compared with the method used to create the 2003-based cohabitation estimates, the APS is generally used here in place of the LFS (Labour Force Survey). For both the LFS and APS, the household datasets are used.
 - 8 At present, estimates of the cohabiting population do not include people in same-sex cohabiting couples or civil partners. These population sub-groups are currently included in the population 'not cohabiting' and are not separately identified. The main reason for this is that these populations are difficult to estimate accurately, particularly at the level of detail required by the current methodology. Any estimate will also be affected by response errors; for example, surveys such as the Labour Force Survey and Annual Population Survey only collect information spontaneously volunteered by same-sex couples. It is therefore the case that same-sex cohabiting couples and civil partners (although not separately identified) will be included in one of the following population categories: single and not cohabiting, separated and not cohabiting, divorced and not cohabiting, or widowed and not cohabiting. The category will depend upon their legal marital status, without consideration of any legal marital status relating to civil partnership.
 - 9 For more information (and the revised estimates) see www.statistics.gov.uk/statbase/Product.asp?vlnk=15107
 - 10 There are some fluctuations, but these are difficult to interpret due to the small sample size (Combined, the separated and widowed were only 4 per cent of the cohabiting population in 2007).
 - 11 The allocation used a mean of APS and GHS estimates for (a) the population cohabiting, and (b) the population not-cohabiting, for each marital status. These totals were then converted into the proportion (a) cohabiting, and (b) not-cohabiting, for each marital status. The initial estimates were then allocated according to these proportions (Note: Although the APS estimates were for 2007, the GHS estimates used a mean of 2006 and 2007 data. This was in order to boost the sample size and achieve more reliable estimates).
 - 12 The APS is essentially the LFS plus a series of sample boosts. See footnote 5 above.
 - 13 The initial estimates of the cohabiting and the non-cohabiting population by sex and marital status are revised in a two-stage iterative operation. The first stage constrains the estimates to the 2007 (legal) marital status estimates. The second stage ensures that the cohabiting population matches the initial estimated population totals by sex and cohabitation status.
 - 14 Again, the estimates are revised using a two-stage iterative process. The first stage constrains the estimates so that the number of separated (but still legally married) men equals the number of separated (but still legally married) women. The second stage ensures that the cohabiting population matches the initial estimated population totals by sex and cohabitation status.
 - 15 The proportions in each five-year age group were calculated from an average of the last three years APS household data (2005, 2006 and 2007) and then the final estimates were allocated using these proportions. Since the APS has a far larger sample size, this might be seen as an improvement over the last (2003-based) estimates where an average (for multiple years) of LFS and GHS data was used for allocating to five-year age groups. Unlike previous years, no smoothing was undertaken for the age profiles. The allocated (2007) results produced by this method were checked using 2006 GHS data.
 - 16 Previous methods also used Beers coefficients. For more information on these, see: Shryock, HS, Siegel, JS, and Associates (1976) 'The methods and materials of demography' (condensed edition), New York: Academic Press Inc, p 556. To begin with, pseudo rates were created for each age group and marital status using the cohabitation estimates as numerators and the legal marital status estimates as denominators. These pseudo rates were allocated to single years of age using the Beers coefficients and then multiplied by the legal marital status population (the source used for the rate denominator) for each single year of age. Final adjustments were made to ensure that the total population matched the legal marital status population by age group (exactly that used for the rates). A small number of negative estimates (arising from the Beers method, mostly at the youngest ages) were then removed using the 2001 Census proportions cohabiting (by single year of age) to allocate the total cohabiting population for the age group containing the negative estimate.
 - 17 For example, the number of 16 year old single non-cohabiting men is calculated by subtracting the number of 16 year old single cohabiting men from the total number of 16 year old single men as given by the legal marital status estimates. The same calculations are carried out for single women, and for divorced and widowed adults (again separately for men and women).
 - 18 The method was almost identical to the allocation for other legal statuses (see footnote 17), and the only variation for this single year of age allocation was to use the total married population as the denominator for pseudo rates. Given the fact that there are no legal marital status estimates for the separated population, this was felt to be the most appropriate denominator.
 - 19 Quality checks were carried out for all aspects of the methodology. Table 2 shows the extent to which the initial estimates were constrained, to improve the estimates, and indicates the uncertainty surrounding the survey sources. As discussed, the cohabitation estimates by age group compare well with GHS (taking into account sample size – see: *Allocating the estimates to single years of age*). The final estimates by single year of age were then compared to cohabitation estimates for previous years.
 - 20 The increase for women over 60 is not shown because of rounding.