

# **Space per person in the UK: A Review of densities, trends, experiences and optimum levels**

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## **Abstract**

This paper forms part of the Foresight Project on Land Use Futures. It reviews the issue of 'space per person' in the UK. It uses relevant literature and data to identify various means of measuring living space. In particular, it sets out differences in measures of density such as 'population', 'residential' and 'household'. It then establishes the current UK experience of space per person, measured using these various concepts, and offers a spatial analysis by country and region. It finds that the UK is inhabited at 257 people per km<sup>2</sup>, and is one of the most densely populated countries in Europe. The paper then reviews trends in personal space over time, assessing if the UK is getting more or less 'crowded'. It finds that although new homes are smaller and built at higher densities than the existing stock, the population is living less intensively than previously (i.e. occupying, on average, more space per person). This is due to decreasing average household sizes. The paper then sets out some social, economic and policy drivers that have affected these trends, and looks at how people perceive space. The issue of 'optimum space' is explored, in relation to population, and to dwelling densities and sizes. The paper concludes with some thoughts on how and why amounts of 'space per person' may change in the future.

## 1.0 Introduction

'The unresolved difficulties associated with defining and measuring population density strictly circumscribe the scope and nature of the conclusions that can be properly derived from differentials in man:land (*sic*) ratios. Any conclusions about human density will have meaning only to the extent that they are based on a recognition that this density must be viewed in both static and dynamic terms and that it cannot be isolated in analysis, from either the social or cultural setting, the demographic characteristics of the population, or the broader processes of social change within the society' (Day and Day, 1973, p.1016)

This paper reviews the issue of 'space per person' in the UK. It uses relevant literature and data to identify various means of measuring living space. In particular, it sets out differences in measures of density such as 'population', 'residential' and 'household'. It then sets out current UK levels of space per person, measured using these various concepts, and offers a spatial analysis by country and region and an international comparison. The paper then reviews trends in personal space over time, assessing if the UK is getting more or less 'crowded'. The paper also sets out some social, economic and policy drivers that have affected these trends. The issue of how people experience space is then reviewed, and the concept of 'optimum space' explored. The paper concludes with some thoughts on potential drivers of future changes in 'space per person'.

### 2.0. How is space per person conceptualised and measured in the UK? How does this relate to 'population densities' and 'living space' and do the UK's methods differ from those used elsewhere?

2.1 One would expect that establishing the extent of 'space per person' would be a straightforward calculation of a person:land ratio. Such calculations can be made, but the issue of space is more nuanced than this simple average would suggest. For example, are we interested in average space ratios (and what do they tell us?), or in actual space consumption by individuals?, or, perhaps, in the amount of space given over to residential development? As a response to these and other questions, a number of measures of space per person are now in common usage.

Three concepts are often used in discussions about the amount of 'space per person' in the UK: *population* density (number of people per area unit); *dwelling* density (number of dwellings per an area unit of land) and *dwelling size* (measured by floor space or number of bedrooms). These measures and their usefulness in understanding 'space per person' are discussed (see also Jenks and Dempsey, 2005; Burton, 2002).

2.2 *Population density* is a measure of population (usually resident) per a particular area unit, most usually person per square kilometre. It is the most commonly used measure in population statistics. This is a useful measure when comparing large areas, such as cities and regions, but is dependent on where boundaries are drawn. It is less useful in understanding 'actual' levels of space per person, as it takes no account of the distribution of space between individuals. To add more depth to studies on density, a number of further measures have been developed by geographers and demographers, to reveal different population density characteristics. For example, measures of '*population potential*' are used to assess the extent of 'concentration' of the population. In effect this is a measure of 'crowdedness'. If an area is densely populated but those nearby are sparsely populated then the figure is low: if the area is surrounded by lots of people in all directions, the figure is high (Easton, 2008). Some geographers also use a '*population weighted mean*' (which contrasts with the usual *area weighted mean*). A population weighted mean measures the density at which the *average* person in an area lives. For example, in 1991, the area weighted mean of Britain was 2.38 persons per hectare (238 persons per km<sup>2</sup>) or one person for every 4,200 m<sup>2</sup> of land, whereas the population weighted density of Britain was 13.21 persons per hectare. This means that most people were living at over 5 times the conventional

population density at which the average piece of land in Britain is developed (Dorling and Atkins, 1995). Although these measures are very useful in gaining a deeper understanding of space use, by far the most common measures used are simple person densities.

2.3 *Dwelling densities* are also widely used as a measure of the intensity of residential land uses in the UK, particularly in housing and planning policies (see *PPS 3: Housing*, DCLG, 2006a). Here the commonly used metric is dwellings per hectare (less commonly, bed spaces per hectare). This measure is useful in understanding densities in built up areas and is a proxy measure of space per person. However, it allows for different interpretations on the ground, and again, tells us little about the distribution of space between households or individuals. It is also important to understand whether any measure of dwelling density is referring to gross or net densities. Gross density includes open space, roads and other buildings on a site, and net density refers only to the actual buildings (Dempsey and Jenks, 2007). Similarly, sometimes 'residential' density is used as distinct from 'net' density (residential densities also exclude non-residential uses). It is arguable which measures are most useful when looking at individuals' space consumption, as the inclusion of non-residential and other space may or may not be appropriate.

2.4 *Dwelling size* is a measure of the attributes of a habitable unit. Both *floor areas* and *room numbers* are used in the UK, but the general currency for housing statistics, planning practice and house sales is number of bedrooms. For the purposes of studying space per person, information about dwelling *sizes* (*floor areas*) is very useful. It is a measure of how much 'private' indoor space people consume. Measuring homes by *bedroom numbers*, whilst giving a general picture of space, can be misleading as houses with the same number of rooms can vary considerably in floor space (as data presented in Table 1 below show). Similarly, bedroom data gives no information on the extent of outdoor space or land take. Hence, for the purposes of this study, floor space data would be more revealing, but are less widely available.

2.5 It is useful to know how space is measured in other countries, to determine the extent of useful comparisons. In terms of the simple 'population density' measure (persons per km<sup>2</sup>) the UK uses a metric that is consistent in demographic studies across the world. There are now a number of global databases that can be used as reference resources, making international comparisons easy (e.g. at <http://www.citypopulation.de>; <http://www.ciesin.columbia.edu/datasets/cir/gpopdb-home.html>; and <http://www.geographynetwork.com>). Dwelling density measures vary in different countries, with many using plot ratios, bed spaces per hectare, or other floor space measures instead of the dwelling unit. Dwelling size measurements also vary significantly in different countries. The UK is uncommon in its use of number of rooms to describe dwellings (HATC, 2006). Most European countries, the USA, and Australia use floor space. Hence most international databases on dwelling sizes use m<sup>2</sup> (some contain indoor and outdoor space measures), making comparisons with UK data difficult.

### **3.0 What is the current picture in terms of 'space per person' in the UK? What are the differences by country and region? Are there other significant spatial differences?**

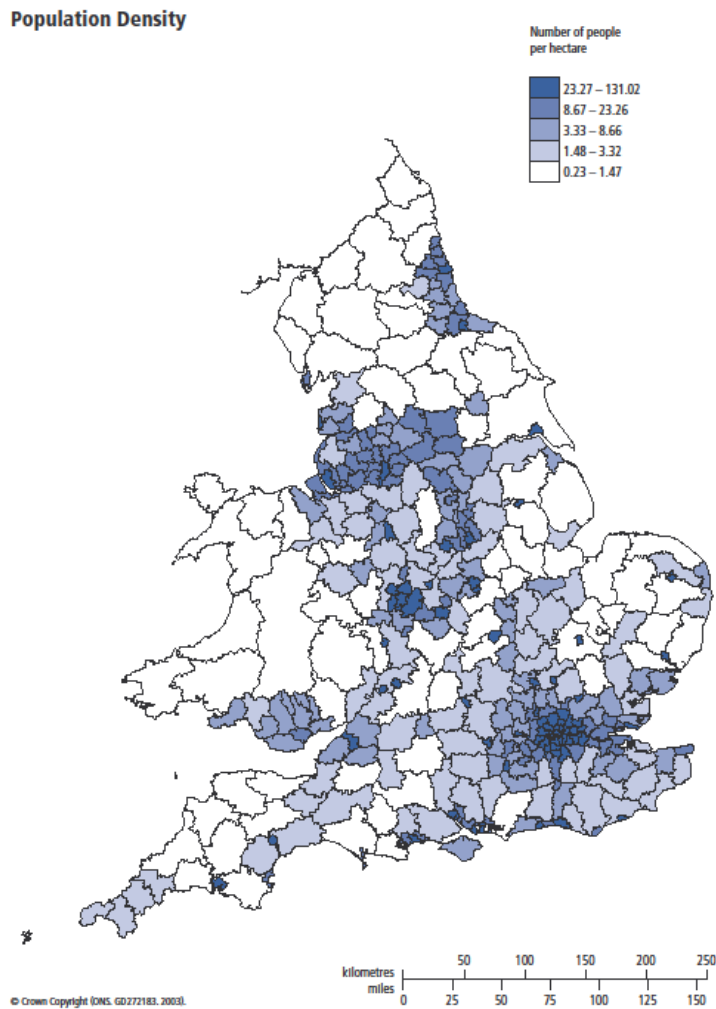
3.1 To answer these questions, it is important to take forward the aforementioned differing concepts and measurements of space per person, as these demonstrate a complex picture of space consumption in the UK today.

3.2 First, in terms of *population densities*, it is important to remind ourselves that the UK population is very unevenly distributed. 84% of the population live in England, 9% in Scotland, 5% in Wales, and 3% in Northern Ireland. Of the total population, 80% live in urban areas, although these make up only 9% of the total land area. This distribution has a significant impact on population density distributions.

Overall, the UK population lives at an average of 257 people per km<sup>2</sup>, or around half a hectare per person, but this masks considerable spatial differences. The highest densities are in London

(4726 per km<sup>2</sup>), but this high figure is explained partly by the regional boundary that includes almost exclusively built-up land. The lowest densities are in Scotland (65 per km<sup>2</sup>), but even here the figures range from 8 persons per km<sup>2</sup> in the Highland region to 3,309 in Glasgow (see Figs 1, 2 and 3 below). London is nearly ten times more densely populated than the North West, the region with the second highest concentration of people (484 per km<sup>2</sup>) (see Fig. 4).

**Fig. 1 Population density England and Wales (2001 Census)**  
**Source: ONS, 2009a**  
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**Fig. 2 Population density Scotland (2007)**  
**Source: ONS, 2009b**  
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Population density of Scotland: by council area, 2007

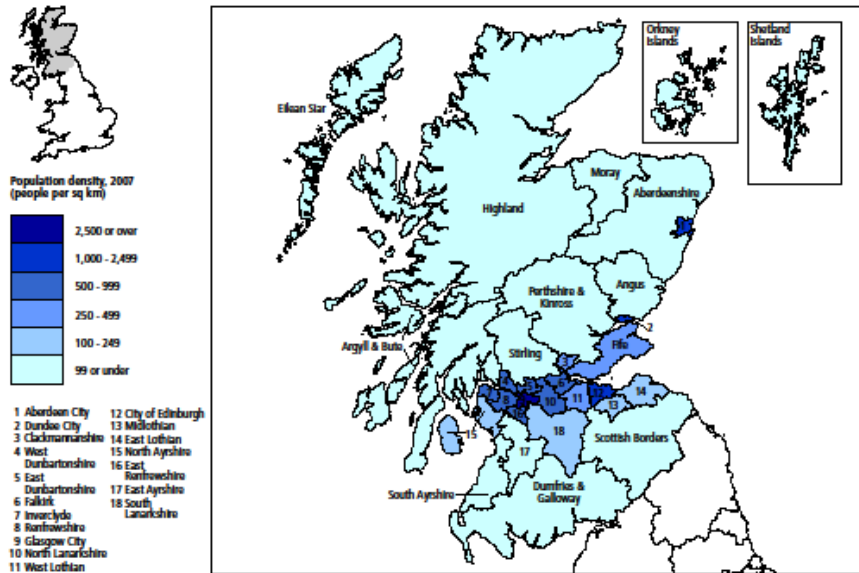
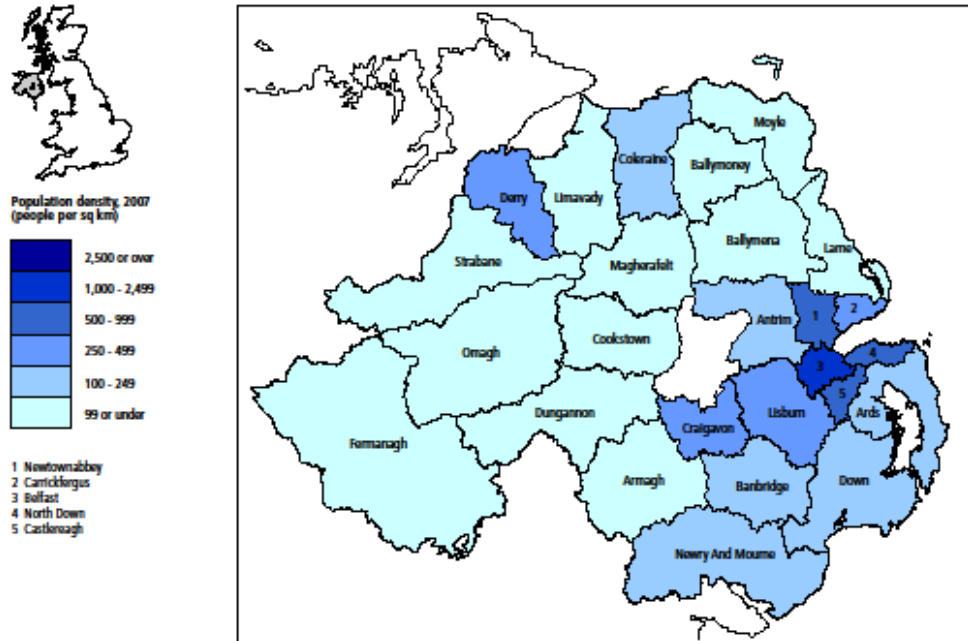


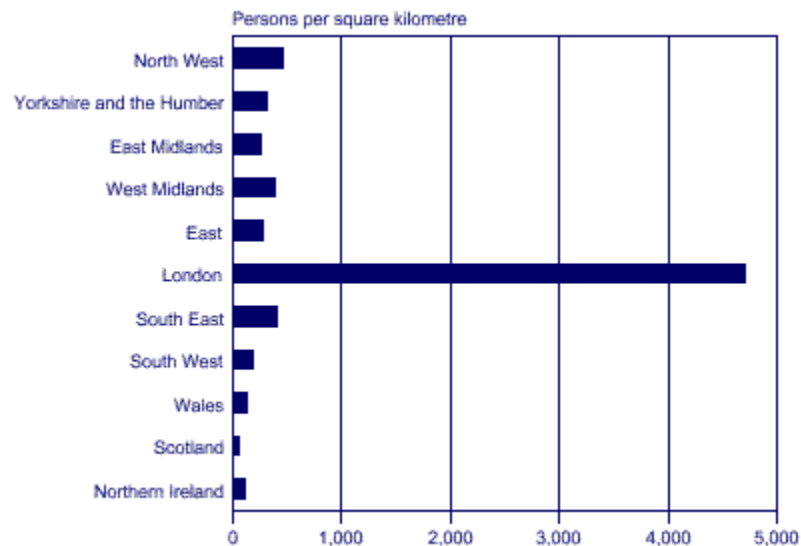
Fig. 3 Population density Northern Ireland (2007)  
Source, ONS, 2009c  
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**Population density of Northern Ireland: by district council area, 2007**



**Fig. 4 Persons per km<sup>2</sup> UK and Government Office Regions (2001)**  
Source: ONS, 2009d

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There are also differences in density between settlement types, in general smaller settlements are less densely populated than large cities: with large cities averaging 2787 residents per km<sup>2</sup>, medium ones 2060 (ONS, 2009d).

3.3 As would be expected, *population densities map quite closely onto dwelling densities*. Although, there are areas (such as inner cities) where, for a number of social and economic reasons, homes are more intensively occupied, and others such as retirement areas, where many older couples and single people live, where homes are far less intensively used. This said, inner areas also tend to be more mixed in terms of use, so dwelling densities are not always particularly revealing.

Dwelling densities in the UK vary considerably for different types of urban area. Large cities have an average of 40dph, whereas average densities for free standing towns of 10,000 homes are in the range of 10-20 dph (Whitehead, 2008). For new housing, densities have increased from an average of 25 dph in 1997 to 46 dph in 2008 (DCLG, 2009)

3.4 In terms of the *amount of dwelling space* that people occupy the average space occupied (in England) is 44 m<sup>2</sup>. As the number of people in the dwelling increases, average floor space decreases, as one would expect because of sharing communal spaces such as living rooms, kitchens and bathrooms. Those in the owner occupied sector have more space on average (46 m<sup>2</sup>) than those in social housing (36m<sup>2</sup>) (ODPM, 2003).

#### 4.0 How do UK measures of 'space per person' compare with those of other countries, particularly in Europe?

4.1 Whether viewed in terms of populations *densities, dwelling densities or dwelling spaces* the UK has less space than many other developed countries, and most other European countries. At 257 people per km<sup>2</sup>, the UK has a *population density* just lower than countries such as Sri Lanka (306), India (344) and Japan (338), although it is far below the most densely populated countries such as Taiwan (636) and Bangladesh (1035). The UK is the *third most densely populated country in the EU*, after the Netherlands and Belgium. However, as stated above, these national figures disguise huge variations in population concentrations. If one looks at the regional picture, London and the South East are amongst the most densely populated areas in the world (again, due partly to boundary conditions), yet other parts of the UK are populated very sparsely.

4.2 *Dwelling densities* in large UK cities (the ten areas with more than 500,000 population) average just over 40dph, half as high again as the EU average and comparable to Japanese cities (Whitehead, 2008). Smaller urban areas in England and Wales average 36dph, well above the EU norm. Since the mid-1990s London's densities have increased, and estimates are now that, at above 50dph, the city has levels above Paris, Frankfurt, Amsterdam, and even Tokyo and New York (Gordon, 2007 cited in Whitehead, 2008).

4.3 In terms of *dwelling size*, the UK has the 5th smallest homes in Europe, 87 m<sup>2</sup> (Table 1). However, it has the 4th (joint) highest number of rooms (4.7). Hence, the UK has, on average, the third smallest average room sizes (18.5 m<sup>2</sup>) (Ministry of Infrastructure of the Italian Republic, 2007; see also analysis of this data by Roys, 2008). If one compares UK house sizes with countries such as the USA (average dwelling size 215 m<sup>2</sup>) and Australia (average dwelling size 227.6 m<sup>2</sup>) an even more contrasting picture emerges.

**Table 1 Average useful floor area, number of rooms and average room size (existing dwelling stock) in Europe**

	Floor space	All dwellings		
		No. rooms	Room size	
UK	87	4.7	18.5	
Austria	94	4.1	22.9	
Belgium	81	4.7	17.2	
Denmark	113	3.8	29.7	
Finland	77	3.6	21.3	
France	90	4.0	22.5	
Germany	90	4.4	20.5	
Greece	81	3.8	21.3	
Ireland	104	5.6	18.6	
Italy	96	4.2	22.8	
Luxembourg	125	5.5	22.7	
Netherlands	98	4.2	23.3	
Portugal	83	4.3	19.3	
Spain	90	5.0	18.0	
Sweden	91	4.2	21.6	

*Source: Housing Statistics in the European Union, 2005/6 (Ministry of Infrastructure of the Italian Republic, 2007)*

The UK has a relatively low number of people per dwelling (2.3) compared with the rest of Europe (e.g. Spain, 3; Ireland 2.9). Only Denmark and Sweden (2.1), the Netherlands and Finland (2.2) are lower.

**5.0 What are the current trends in space per person in the UK? Do we have more/less space now than in the past? Is it more/less equally spread? What are the causes of these trends?**

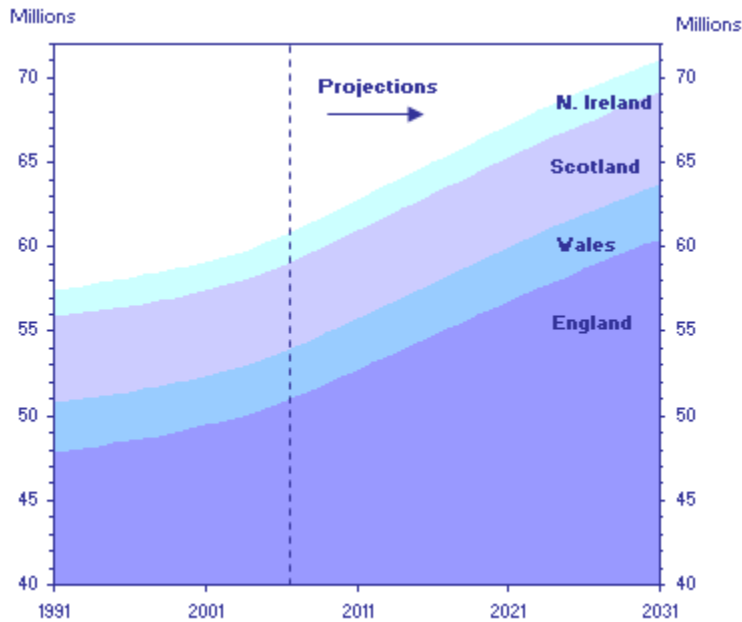
5.1 The picture of shifting space per person in the UK is complex. Overall, the population has grown continuously over the last century, and is projected to increase to 71 million by 2031 (ONS, 2009e) (Fig.5). This rise is due mainly to natural increase (more births than deaths) and because it is assumed there will be more immigrants than emigrants. Hence, in simple terms the amount of space per person is reducing year on year. However, as stated above, this crude calculation masks a number of trends in both local and regional densities, and in the ways in which the UK population forms households and consumes living space.

**Fig. 5 Actual and Projected UK Population**

**Source: ONS (2009e)**

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5.2 At the national level, the most detailed analysis of population change over time has been carried out by Dorling and Atkins (1995). Their study analyses shifts in population density in the UK between 1971 and 1991. This shows a mixed picture of change in densities, with Greater London seeing the largest gains, and many areas becoming less dense. Brought up to date, the last Census (2001) shows that since 1991 only London saw a significant increase in density, with the East Midlands, North West of England and Glasgow becoming less densely populated.

5.3 In terms of living space, the picture is more complex still. There has been a downward trend in household size for some time now. We currently occupy our stock at about 2.3 people per dwelling. Only 7% of households in the UK contain more than 4 people (half the figure for 30 years ago). The proportion of one-person households rose from 18% to 29% over the same period (ONS, 2004). Traditional families make up a decreasing proportion of the population. In addition, almost 70% of the projected household increase to 2016 will be single person households, nearly half of which will contain pensioners. These trends have significant implications for the 'intensity' with which we occupy the housing stock, particularly the privately owned sector. On average personal living space has risen from 38m<sup>2</sup> per person in 1991, to 44m<sup>2</sup> in 2001 (ODPM, 2003).

5.4 This shrinking household size has coincided with a decreasing size of new dwellings (although the assumption that smaller homes are desired by smaller households is not always correct). New houses are, on average, smaller than the existing stock (an average of 83m<sup>2</sup> in new build, compared with 87m<sup>2</sup> in existing). They are also smaller than those in all other countries in Europe, except Italy (Table 2), and have the third smallest rooms.

**Table 2 Average useful floor area, number of rooms and average room size (newly built dwellings) in Europe**

	New dwellings			
	Floor Space	No. rooms	Room size	
UK	83	4.5	18.4	
Austria	101	3.5	28.8	
Belgium	105	5.8	18.1	

Denmark	107	3.4	31.4
Finland	90	3.8	23.6
France	111	4.0	27.8
Germany	114	5.1	22.3
Greece	124	3.2	38.8
Ireland	105	5.6	18.8
Italy	77	3.5	22.0
Luxembourg	120	5.2	23.0
Netherlands	115	3.9	29.4
Portugal	89	4.9	18.1
Spain	101	6.0	16.8
Sweden	94	4.2	22.3

Source: Housing Statistics in the European Union, 2005/6, Ministry of Infrastructure of the Italian Republic (2007)

New Dwellings are classed as those completed after 2001

5.5 This trend can also be viewed through the changing nature of housing completions in England (Whitehead, 2008). Table 3 shows increases in the proportion of one and two bed dwellings, and a decrease in 3 and 4 bedroom homes between 2001/2 and 2004/5. It also shows that new completions of flats were up by 146% while houses were down 11%.

**Table 3 The changing make-up of completions in England**

	Completions		Change
	2000/2001	2004/2005	
England			
1 bed	7	10	
2 bed	27	38	
3 bed	34	29	
4+bed	32	23	
Flats	20 (25,970)	41 (63,920)	+146%
Houses	80 (103,890)	59 (91,980)	-11%
Total	129,866	155,893	+20

Source: Whitehead (2008) using DCLG (2006)

### 5.6 What are the causes of these trends in density and space?

These trends in space consumption are the result of the interplay between a number of factors, including demographic changes, land and housing economics, and planning and housing policies. Broadly, in the UK in the post war period, planning has limited the supply of land for housing. It has attempted to protect open greenfield land and contain urban development. In the last 15 years, there has been an explicit and continued effort to concentrate development in existing built up areas, and to raise housing densities. This pattern of spatial development is seen as contributing to sustainability and urban regeneration. At the same time as these policies have been pursued, demand for housing has grown, with large increases in the number of households being formed (currently around 252,000 per year in England). These dual pressures of restricted land supply and increased housing demand saw both land and house prices increase. However, land prices increased more steeply than house prices, and this economic reality, coupled with pro high-density policies, led developers to build more small, higher density units (see Whitehead, 2008 and Barker, 2004 and 2006, for full discussions on these issues). Interestingly, in Scotland, there has not been a policy drive for higher density housing, and here the increase in building densities evident in England has not occurred.

## **6.0 How do people experience current levels of space per person? What is the relationship between space, density and over-crowding? Are there variations in perceptions of space between different societal groups?**

6.1 There is a long history of interest in how people experience space, specifically in relation to density and crowding. Although, as Day and Day (1973) state 'In and of itself, the familiar man:land ratio says more about area than it does about either the human experience of density or the relation of population and resources. This ratio is therefore essentially meaningless as an indicator of comparative conditions of life...' (p.1016). In the UK, surprisingly little is known about satisfaction with space at the national scale. Perhaps this is because people do not experience it in this way. There is far more interest in experiences of neighbourhood and dwelling space. This section takes the national picture first, and then moves to the neighbourhood and dwelling scales.

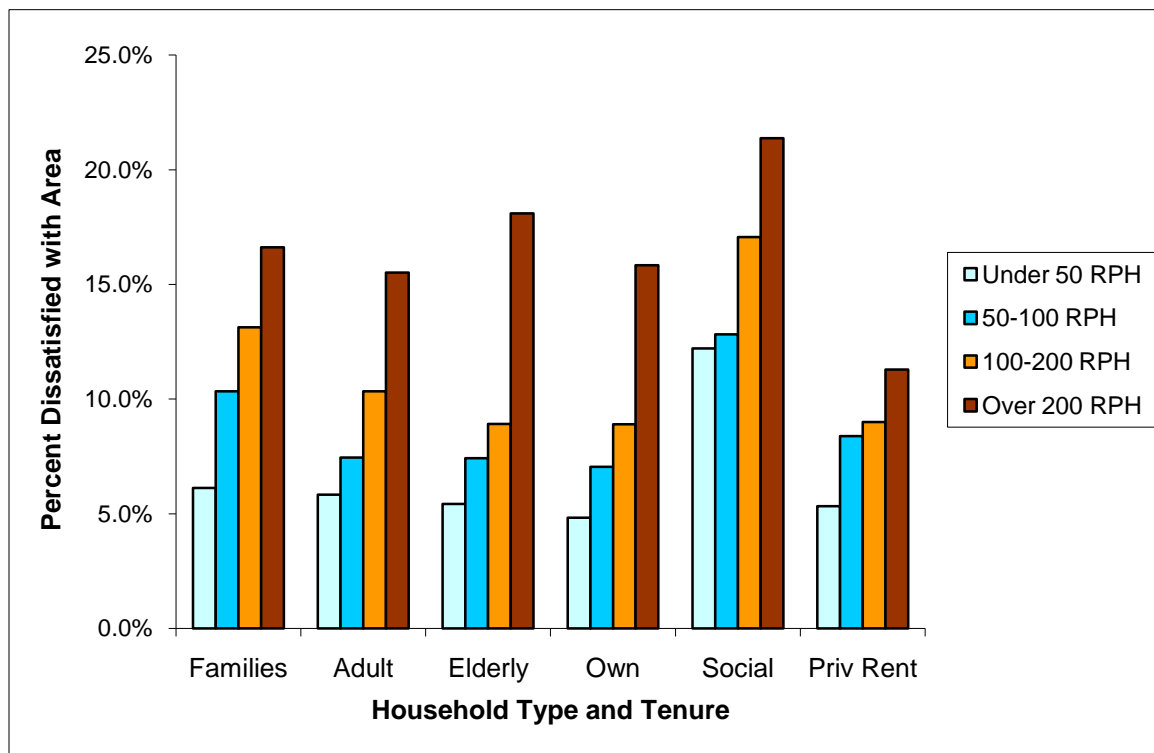
6.2 In terms of *general perceptions of space nationally*, a recent YouGov poll found that 70% of people believe that the UK is overcrowded. However, the issue of the country being 'crowded' or 'full' is closely linked with immigration debates, and it is sometimes difficult to disentangle this issue from attitudinal research at this scale. A MORI poll (cited in Barker, 2006) indicates that public perceptions of the extent of land that is built on in England may add to such perceptions of 'crowding'. The survey found that people think that levels of development are far higher than the actual figure. 10% of people thought that more than three quarters of land was developed, 21% between a half and three quarters, 23% around a half, with the rest thinking the figure was lower than a quarter or didn't know. In fact, the highest actual estimates of developed land are 13.5% (*op cit*, p.44).

6.3 *At the neighbourhood scale*, academics and planning practitioners have long been keen to determine how people experience and perceive different amounts of space (Kucharek, 2006). In particular the issue of 'over-crowding' has been of interest. It is worth explaining the difference between density and crowding (or over-crowding). Density (as stated above) is a measure of people (or sometimes dwellings or households) per unit of space, whereas crowding is seen (by psychologists) as a subjective emotion, involving negative feelings, coping responses, and psychological consequences.

6.4 However, in terms of *housing*, there are also standard measures of 'overcrowding' used in policy. The over-crowding measure uses a 'room standard' which is one or more bedrooms below the 'bedroom standard' (the bedroom standard is calculated based on the number and type of persons in a dwelling, see DCLG, 2007a). The measure is used alongside its 'opposite': under-occupation, measured as two or more bedrooms above the bedroom standard (*op cit*). In England, 554,000 households are classed as living in overcrowded dwellings (2.7% of all households). This figure represents 1.4% of all owner occupiers, 5.9% of social renters, and 5.1% of private renters. England has far higher levels of 'under-occupation'. In fact, 36% of all households are under-occupied. Unsurprisingly these are mainly one and two person households, living in larger dwellings (DCLG, 2007b).

6.5 In terms of *perceptions of density at neighbourhood levels*, research has shown relatively consistently that people tend to prefer lower to high density housing (CABE, 2005a and 2005b; Howley, 2008). For example, Bramley and Power recently examined dissatisfaction with residents' neighbourhoods in five UK cities and found that it increased with density for all groups studied (Bramley and Power, 2009). Although the impact of density reduced once other factors (such as income) were controlled for, it still remained significant (Fig. 5). Research by CABE (2005a) and Burton *et al* (1998) found negative reactions to higher densities, and also to intensification (or densification) of existing urban areas. Recent research by CABE found that most homebuyers thought new housing was too dense (2005a).

**Fig.5 Dissatisfaction with area, by density, household type and tenure**



Source: Bramley and Power (2009)

Supporters of high density living would argue that this type of research is misleading. Some high density areas are the most desirable in the UK, such as inner London neighbourhoods of terraced townhouses, Georgian squares and so on. However, although there are some very good examples of high density developments, on the whole, research shows that people generally aspire to live in lower density areas.

6.6 In terms of *perceptions of space within dwellings*, it is always difficult to disentangle responses to space (or lack of it) from other variables, particularly wealth. As people get wealthier, they tend to consume more space, and hence satisfaction with amounts of space are closely related to people's aspirations, and their achievement of them.

This said, we know from studies of new housing that people feel they do not have enough room. A recent study found that around half of all residents living in new dwellings in London and the South East were dissatisfied with the amount of space in their home, and a separate study found that there is a distinct mismatch between what homebuyers want in terms of size and what the market is producing (HATC, 2006). Most people prefer detached or semi-detached homes, rather than flats or terraces. This may not be surprising, but apartments are first choice for very few people, and they are seen as a compromise given affordability and location (*op cit*).

The new homes being built in the UK today have also been criticised for not providing space for basic living functions. They tend to have very little storage space, and expect rooms to be multi-use (e.g. bedrooms used as offices). There is also a trend for more open plan layouts, and this has implications for privacy. In new build schemes, residents also report a lack of internal or external recreational space (*op cit*).

## **7.0 Is there an optimum amount of space per person? What standards are used in planning and housing practice? How do these relate to debates about competing demand for land?**

7.1 The issue of 'optimum space' has challenged academics and professionals over time, and there are several ways that it can be conceptualised. First, at a national (or even global scale) there is the issue of the *optimum amount of space for the population*. Since space is fixed, this discussion focuses on appropriate population levels: but it is essentially a question of optimum person:land ratios. This discussion is based on a number of criteria, but is most commonly related to ecological footprints, and the 'optimal' population given the amount of land in the country. There is then the issue of '*optimal densities*', both for people and dwellings, and finally the '*optimal amount of living space*' per person or household. Each of these concepts has a considerable literature (and in some cases policy) base: a summary of which is presented here.

7.2 The debate surrounding '*optimum population*' for the UK is politically contentious, and linked explicitly to 'space' (or lack of it). The case for setting an optimum density is usually couched in terms of over-stretched services and public resources, impacts on quality of life, and threats to environmental conditions. In addition many environmentalists interested in issues of energy and food security argue that the UK is over-populated because it does not have enough land to support itself in these key resources. With an ecological footprint of 5.35 (global ha/capita) (WWF, 2002), arguments are made that the UK population is using more than its 'share' of resources.

In terms of population policy, the UK has not been particularly restrictive to date. However, recently, the Cross-Party Group on Balanced Migration has sought Government to adopt policies to limit Britain's population to around 65 million, arguing that the country can not cope with numbers above these, partly on spatial grounds. Opponents of this view argue that the UK is far from overcrowded, with only around 13.5% of the surface area built on (in fact, even in London and the South East only 17.9% of land is built on) (Barker, 2006).

7.3 In terms of '*optimal densities*' (population and dwelling), many studies have evaluated quality of life and preferences for different densities. The results tend to show preferences for most groups for lower density living, but slight variations for different demographic groups, with some younger people more amenable to urban living, and, in some studies, older households preferring medium density housing (CABE, 2005a; JRF, 1993; IDGO, 2009). Research also tends to show that the quality of the environment is very important in determining an optimum. Well designed environments can be very desirable at high densities. And of course, international experiences of 'optimal' densities vary greatly: what is deemed high density living in the UK is very different to high densities in, for example, parts of Asia or South America.

In determining 'optimal' densities, one can find exponents arguing for strategic benefits of higher density living (e.g. lower public service costs, lower per capita energy use, increased feasibility of public transport, and efficient use of land). Economists have also developed 'optimal land use models' to determine the most 'efficient' balance of uses. Yet these definitions sit uncomfortably alongside conceptualisations of 'optimal' based on attitudinal research (and market realities) that see most people in the UK preferring, or aspiring to, lower density living.

The difficulty in determining an 'optimal' density has made being prescriptive in planning policies very difficult. Current planning policy has tackled this issue by giving minimum expected density standards of 30 dph for new dwellings (DCLG, 2009), with an assumption that a higher level is desirable. However, the extent to which this figure is based on any clearly defined notion of 'optimum' is debatable.

7.4 In terms of *optimal 'dwelling sizes'*, ideas drawn from psychology, sociology and anthropology have all informed thinking about how to design homes in tune with human needs. Most agree that what is crucial is that people have enough private space for the normal functions of living together: eating, sleeping, resting and maybe working. In accommodation for two or more people

this means that there are either two separate living areas, or the bedrooms are large enough to be used for recreational activities or study/work as well as for sleeping, dressing etc. In addition, there is also evidence that both adults and children need to have external recreational areas, where they feel safe, and which they see as within their 'ownership' (HATC, 2006). This could be in the form of gardens, communal play areas or private balconies.

These functional requirements of a dwelling are operationalised into '*space standards*' for new dwellings in most countries in Europe. Yet, the UK has not consistently used space standards across the public and private sectors to control the size of dwellings. In the past, various standards have been used, mainly in public housing to ensure *minimum* sizes. The most significant standard was the 'Parker Morris Standard', which was based on empirical research about households needs in the 1960s. Most other countries in Europe use the planning or building regulation systems to implement space standards (every country except the UK has some requirement for the size of habitable rooms) (*op cit*). Whilst these standards may reflect 'minimum' sizes, rather than an 'optimum', there is no doubt that other countries have been more successful at maintaining larger dwellings. This is because, in the absence of controls, developers will try to reduce the size of dwellings without reducing value.

## **8.0 What are the key drivers and trends that are likely to affect 'space per person' in the UK in the future?**

8.1 It goes without saying that predicting future trends is likely to be imprecise, but some specific drivers can be identified. In the main, the impacts of demographic change, planning and housing policies, and the land and property markets will be the main factors influencing change, but there are other socio-cultural and environmental elements to consider as well. The discussion is framed here in terms of trends in demand for, and supply of, space.

### **8.2 Trends in demand for space**

8.2.1 We have already seen that the UK's population is projected to grow to 71 million by 2031. This increase will, by definition, increase national population densities and reduce the overall amount of space per person. The extent to which the government is willing to intervene in population growth will be a key issue, specifically in relation to immigration. In addition, shifting social and economic conditions may make the UK a more or less attractive destination for migrants.

8.2.2 Along with the increase in population is the projected increase in the number of households in the UK. Current official projections are that over 252,000 households are being formed annually (in England, with similar proportional increases in Scotland, Wales and NI), and this clearly has implications for living space and densities. The forecasters predict that an ageing population and other social changes, such as couples forming later in life, and higher divorce rates will continue, and mean an increase in demand for homes. Yet, household size is difficult to predict as it 'results from a complex mixture of factors such as income, house prices and availability, employment opportunities, social provision for children and the elderly, and the age at which young people move into their own homes.' (Boardman *et al*, 2005). Because predicting household formation is not an exact science, there are various views on whether the official projections are correct. For example, some analysts argue that the rate of household formation may slow down because more families may choose to live with their extended families in the future. Trends such as rising house prices, increased life expectancy, pension under-funding and increased costs of residential care may influence these decisions. These factors could see the number of three-generation families living together rising from 75,000 to 200,000 over the next 20 years, and such trends could temper the projections (*op cit*).

Notwithstanding these types of debate around the household figures, most commentators and policy makers assume a relatively high level of continued demand for new homes. Several influential reviews have attempted to assess the drivers and consequences for spatial

development (Barker, 2004 and 2006; Entec, 2005). In her review of land use planning, Kate Barker estimates that only by increasing levels of higher density new developments in urban areas can a large proportion of the demand for new homes be met without recourse to substantial greenfield development. However, she asserts that, even with average densities above 41 dph some development will be required on 'presently undeveloped land beyond towns and cities' (op cit, p.57). Given the arguments set out above about land prices, housing demand, and planning policies, it is fair to predict that developers will continue to provide small, high density units in urban areas, perhaps rising above current UK norms. We may also see continued increases in density on greenfield sites.

It is also likely that the growing population (and number of households) will not be spread evenly across the UK. Projections show increases in household numbers for all four countries of the UK, although some population decline is expected in Scotland and in the North East and the North West of England (ONS, 2009e; General Register Office for Scotland, 2008). Projected household growth in the English regions is highest in the South East, South West and East Midlands. Hence, space in already highly populated areas is likely to come under more pressure (Barker, 2006; Entec 2005). This pattern will also be affected by migration within the UK which is favouring the South West and South East (Champion, 2005).

Of course, demand for homes is highly dependent on wealth. In these uncertain economic times it is difficult to forecast the impact of changing wealth on personal space consumption. However, it is well established that in the UK, when people can afford to, they buy more space. Between 1996 and 2001 the highest earners bought or rented accommodation that was 17m<sup>2</sup> per person on average larger than that for the lower earners (Boardman *et al.*, 2006). There is also a view that socio-cultural changes could have a major impact on the types of homes, and hence domestic space, we desire. In particular, we know little about what housing choices older people will make, or about the impacts that innovations in ICT, home entertainment, and home working may have.

### **8.3 Trends in supply of space**

8.3.1 Land is, to all intents and purposes, a fixed resource. We can not create more land to meet demand. However, as set out above, the way land is governed, via the planning system affects population densities, dwelling densities and sizes. These policies have restricted development and, as set out above, contributed to both land and house price increases and to the production of smaller dwelling units.

In the future, due to concerns over rural protection and urban regeneration, it is likely that these 'compact city' policies will continue. In many parts of the country sufficient brownfield land has been identified in urban areas to accommodate the required housing growth. However, in some instances the supply of land may be restricted by the high costs of development, perhaps related to contamination, poor infrastructure, or other environmental considerations. In such cases fiscal interventions may be required to bring land back into use for housing (Barker, 2006). There will also be the requirement, in some parts of the UK, (mainly in the South of England) for the aforementioned greenfield development.

With respect to *dwelling sizes*, levels in the private sector are currently set by developers responding to development costs, planning policies and desired profit margins. Without the restrictions of mandatory size standards, and within the context of rising demand, they are free to continue the downward trend in floor space. However, recently, the issue of decreasing home sizes has become politically contentious. For example, in London, the Mayor has argued that new homes are not comfortably habitable, and has stated an ambition to introduce minimum standards. In the future, the extent to which the government is prepared to intervene in setting size requirements (for the private and public sectors) will have an impact on living space. There are some calls to bring the UK into line with most other EU countries and set minimum dwelling standards.

In addition to issues surrounding the land and property markets, a number of wider global trends could impact on the supply of land for housing. First, as climate changes, parts of the UK may become less habitable: for example, areas prone to flooding will be off limits for new development (Entec, 2005). Land for housing development may also be constrained because of competition from other land uses. For example, food and energy security are becoming more significant in policy debates, and the extent to which land for these uses is prioritised, in policy, could become a driver for change in policies on housing land. Finally, the question of just how many people can be sustained on an area of land the size of the UK is becoming more widely debated in serious policy fora. Debates about how developed and undeveloped land can best be used for a sustainable future, not only in terms of energy and food, but also in terms of domestic lifestyles and commercial activities, may well inform some radical, and as yet unforeseen, policy shifts over the coming decades.

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## References

Barker K (2006) Review of Land Use Planning, HM Treasury, London

Barker K (2004) Review of Housing Supply: Securing Future Housing Needs, Final Report, HM Treasury, London

Boardman B, Darby S, Killip G, Hinnells M, Jardine C N, Palmer J and Sinden G (2005) 40% House, Environmental Change Institute, Oxford

Bramley, G and Power, S (2009) Urban form and social Sustainability: the role of density and housing type, Environment and Planning B: Planning and Design, 36, pp 30-48

Burton E (2002) Measuring Urban Compactness in UK Towns and Cities, Environment and Planning B: Planning and Design, 29, 219-250

Burton E, Williams K and Jenks M and Entec (1998) Urban Intensification: Impacts and Acceptability. Report presented to the Department of the Environment, Transport and the Regions.

CABE (Commission for Architecture and the Built Environment) (2005a) What Home buyers Want: Attitudes and Decision Making Among Consumers, CABE, London  
Census, Crewe, 20th June, 2005

CABE (Commission for Architecture and the Built Environment) (2005b) What it's like to Live There? The Views of Residents on the Design of New Housing, CABE, London

Champion T (2005) Migration Data from the 2001 Census: What Insights for Local Authority districts? Paper presented to the LARIA/CCSR/LGA Seminar on Migration Statistics from the

Day A T and Day L (1973) Cross-National Comparison of Population Density, Science, 81, 4101, pp 1016-1023



DCLG (Department of Communities and Local Government) (2006a) Planning Policy Statement 3 (PPS3): Housing, DCLG, London

DCLG (Department of Communities and Local Government) (2006b) Housing Statistics Tables 232, 241, 252

DCLG (Department of Communities and Local Government) (2007a) Survey of English Housing, Preliminary Results, 2006/7, DCLG, 2007

DCLG (Department of Communities and Local Government) (2007b) Tackling Overcrowding In England: An Action Plan, DCLG, London.

DCLG (Department of Communities and Local Government) (2009)  
<http://www.communities.gov.uk/planningandbuilding/statistics/landusechange>

Dorling D and Atkins D (1995) Population Density, Change and Concentration in Great Britain, 1971, 1981 and 1991. Studies on Medical and Population Statistics, No.58, HMSO, London

Easton M (2008) Crowded Britain? [www.bbc.co.uk/mapoftheweek/2008/09/08](http://www.bbc.co.uk/mapoftheweek/2008/09/08)

Entec (2005) A Sustainability Impact Study of Additional Housing Scenarios in England, ODPM, London.

General Register Office for Scotland (2008) Estimates of Households and Dwellings in Scotland, 2007, RGO, 2008

Gordon I (2007) Sustainable Energy Management and the Built Environment, Office of Science and Innovation, November 2007

HATC (2006) House Space Standards, A Report by HATC Ltd. for the Greater London Authority, GLA, London

Howley P (2008) Attitudes towards Compact city Living: Towards a Greater Understanding of Residential Behaviour, Land Use Policy, published online, 28th November

IDGO Inclusive Design for Getting Outdoors (2009) <http://www.idgo.ac.uk/>

Jenks M and Dempsey N (2005) The Language and Meaning of Density, in Jenks M and Dempsey N eds Future Forms and Design for Sustainable Cities, Architectural Press, London

JRF (Joseph Rowntree Foundation) (1993) Older People's Satisfaction with Their Housing, Housing Research 146, [www.jrf.org.uk/knowledge/findings/housing/H146.asp](http://www.jrf.org.uk/knowledge/findings/housing/H146.asp)

Kucharek, J-C (2006) Happiness per Hectare, RIBA Journal, May, [www.ribajournal.com](http://www.ribajournal.com)

Ministry of Infrastructure of the Italian Republic (2007) Housing Statistics in the European Union, 2005/6, EC, Brussels.

ODPM (Office of the Deputy Prime Minister) (2003) English House Condition Survey, 2001: building the picture, ODPM, London

ONS (Office for National Statistics) (2004) Social Trends 34: National Statistics, the Stationery Office, London, <http://www.statistics.gov.uk/downloads/theme-social/Social-Trends34/Social-Trends34.pdf>

ONS (Office for National Statistics) (2009a)

<http://www.statisticis.gov.uk/census2001/downloads/density.pdf>

ONS (Office for National Statistics) (2009b) <http://www.statisticis.gov.uk/cci/nugget.asp?.id=1082>

ONS (Office for National Statistics) (2009c) <http://www.statisticis.gov.uk/cci/nugget.asp?.id=1083>

ONS (Office for National Statistics) (2009d) <http://www.statisticis.gov.uk/cci/nugget.asp?id=1038>

ONS (Office for National Statistics) (2009e) <http://www.statisticis.gov.uk/cci/nugget.asp?id=1352>

Roys M (2008) Housing Space Standards: A National Perspective, RIBA Research Symposium (03), RIBA, London.

Whitehead C (2008) The Density Debate: A Personal View, East Thames Housing Group, London.

WWF (World Wild Fund for Nature) (2002) Living Planet Report, WWF, Switzerland.