One-person households – a resource time bomb?

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Abstract

In the western world there is a trend towards the growth of small households, especially one-person households. In resource terms, one-person households are likely to consume more land, energy, goods and materials per person than those living in larger households where resources are shared amongst a greater number of people. Thus an increase in one-person households is likely to accelerate domestic consumption of resources over the next twenty years. This paper demonstrates the scale of the problem internationally and in the UK. It also investigates the UK Government’s response and suggests ways in which it can be tackled in the future.

Keywords: resource consumption, one-person households, occupancy rates, household size, demographic change.

1 One-person household explosion and the potential consumption crisis

Household size has substantially reduced in Europe over the last 40 years. Average household size has decreased in the EU, while at the same time the absolute number of households has increased. More people are living in smaller households, while the proportion living in four or more person households is decreasing. The average household size in the EU in 1981/82 was 2.8 persons; in 2000/1 it was 2.5. However, there is variation throughout the EU. Spain, Portugal and Ireland have the largest households, while Sweden, Finland, Denmark and Germany, closely followed by the UK, have the smallest. The UNCHS-Habitat Indicators Programme, 1997 indicated an increase in Europe of one-person households from the 1960’s onwards. It suggested that the number of one-person households was especially high in Northern and Western Europe,
where the proportion of one-person households increased steadily between 1960-1988, although the size of the share varied from 8-20% in 1960 to 18-40% in the late eighties (10-20% growth). Greatest growth in one-person households during this period occurred in the Netherlands, Sweden and Switzerland, where the number of one-person households doubled (Van Diepen [1]). According to the Economic Commission for Europe by 2003 the smallest households were in Sweden (2.1 persons on average), followed by Denmark, Finland, Germany and Norway (2.2 persons on average). In Norway, more than 40 per cent were one-person households and in Sweden, Finland, Denmark and Germany this proportion was over 35 per cent (Economic Commission for Europe [2]). In the UK the number of one-person households has also grown significantly. Between 1971 and 1998 there was a 10% shift (18% of households in 1971 rising to 28% in 1998). Similar trends are already being experienced in the USA, Australia, New Zealand and Japan.

Evidence suggests that increase in one-person households is likely to have a detrimental environmental impact. The impact of changing demography on the environment has been widely studied (Lui et al [3]). More particularly the link between declining household size, diminishing biodiversity (Cincotta and Engelman [4]); increasing domestic energy consumption (INCPEN [5], Fawcett et al [6], Noorman and Uiterkamp [7], Roy and Caird [8]), increasing carbon dioxide emissions (Fawcett et al [6]) and household waste (INCPEN [5], Noorman and Uiterkamp [7]) has been researched. Lui et al [3] completed a global study to determine the impact of declining household size on biodiversity and natural resources. The study demonstrated that an increase in small households would lead to an increase in resource consumption and loss of biodiversity globally. More households would require more housing units (thus increasing land and materials needed for construction) and smaller households were less efficient in terms of resource use per capita than larger households. Increasing consumption of resources would also lead to a reduction in biodiversity through the loss of habitats and species.

Table 1: Effects of household size on the consumption of energy, materials and production of waste annually per capita (one-person household =100)

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<th>1 person</th>
<th>2 person</th>
<th>4 person</th>
<th>Data Source</th>
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<tr>
<td>Products per capita</td>
<td>100</td>
<td>75</td>
<td>62.5</td>
<td>INCEPEN (UK data)</td>
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<tr>
<td>Packaging per capita</td>
<td>100</td>
<td>75</td>
<td>58</td>
<td>INCEPEN (UK data)</td>
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<tr>
<td>Indirect energy per capita</td>
<td>100</td>
<td>63</td>
<td>42</td>
<td>INCEPEN (UK data)</td>
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<tr>
<td>Electricity per capita</td>
<td>100</td>
<td>68.5</td>
<td>45</td>
<td>Noorman and Uiterkamp (Dutch data)</td>
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<tr>
<td>Gas per capita</td>
<td>100</td>
<td>64.5</td>
<td>39</td>
<td>Noorman and Uiterkamp (Dutch data)</td>
</tr>
<tr>
<td>Solid waste per capita</td>
<td>100</td>
<td>88.5</td>
<td>75.5</td>
<td>Noorman and Uiterkamp (Dutch data)</td>
</tr>
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</table>

Source: Compiled using data from INCPEN [5], Noorman and Uiterkamp [7].
Further research supported the proposition that smaller households were less resource efficient than larger households. One study (INCPEN [5]) used UK data to determine how household size influenced consumption of goods, packaging and indirect energy. It demonstrated inverse relationships between the weight of goods, packaging and indirect energy consumed by a household and household size. Research also showed inverse relationships between direct energy consumption, carbon emissions, household waste and household size (Fawcett et al [6]; Noorman and Uiterkamp [7] and INCPEN [5]). Table 1 summarises the impact of household size on household resource consumption and waste production patterns.

Research by Roy and Caird [8] adopted a more holistic approach to determine the environmental impact of household size by deriving eco-footprints for a variety of households. The analysis studied 692 UK households. It showed that there was a decline in the size of the eco-footprint (per capita) as households got larger. It concluded that the shift to ever-smaller households would have a highly negative effect on the environment, especially in terms of energy consumption, personal transport and land for housing.

From the research it seems that an increase in one-person households could potentially have a significant impact on the environment in terms of resource consumption (materials and energy), waste production, carbon emissions and loss of biodiversity. The effects of these changes will be felt across the globe. The problems are also likely to escalate as other nations in the developed world experience similar demographic trends including USA, Australia, New Zealand, Japan and the rest of Europe.

2 The UK situation

Between 1996 and 2021 the number of households in England is projected to increase by about 3.8 million (19%) as a result of population change (46%); behavioural change (33%) and greater life expectancy (21%). In the UK by 2021 it is estimated that 8.5 million households will be one-person households (i.e. 35.5% of all households). Currently the majority of one-person households are aged over 65 and often widowed. However, the potential growth groups for the future appear to be single people of all ages and in particular single males aged 35-44. Historically, the group have tended to be less affluent, but as the characteristics of the group change in the future, so too may its level of affluence. However, according to the Office of National Statistics [9] the majority of one-person households still appear to be in the lowest income deciles, although this is largely because the majority are retired and receiving only a state pension. Retired one-person households with other forms of pension are more affluent than those on a state pension but still appear largely in the 2nd, 3rd and 4th deciles. Working one-person households are more economically diverse and are well represented in the 1st – 7th deciles. The upper deciles tend to be populated by employed, male, one-person households aged 35-54. Thus if this sector of the group expands in the future (as predicted) so too could average income amongst one-person households and as a result resource consumption.
Further research is needed to determine how changes in affluence amongst one-person households will affect consumption patterns in the future and the relative importance of one-person households in influencing consumption patterns when compared with larger households (especially two person households which are currently the most affluent).

A detailed statistical analysis of UK data (Williams [10]) was completed to determine in greater depth what the resource implications were of an increase in one-person households in the UK particularly amongst the growth groups (i.e. singles and single males aged 35-44) and the largest groups currently (i.e. those aged over 65 and widowed). The analysis showed that household size (when compared to other socio-economic and design variables) was a significant factor influencing resource consumption per capita. In terms of energy four key factors influenced consumption per capita: housing design, household income, age of occupants and household size. Design and affluence were found to be the key factors influencing energy consumption. Household size appeared to have the least influence of the 4 variables, but nevertheless the analysis suggested it was significant. Household size and income appeared to be the key determinants of the land consumption per capita. In this instance household size appeared to be a more significant factor influencing land consumption per capita than income. However, income was the key factor influencing expenditure on household goods per capita, but household size still appeared to have some limited effect. The analysis found that there was an inverse relationship between gas and electricity consumption per capita and household size. In fact one-person households consumed between 23 – 77% more electricity and 38 – 54% more gas than two or four person (all adult) households per capita respectively. There also appeared to be an inverse relationship between the quantity of space (land) consumed per capita and household size. The analysis showed that one-person households consumed between 45 – 65% more space than two or four person (all adult) households per capita respectively. The important finding from the research was not that one-person households consumed more than those living in larger households (per capita), but the scale of the difference. In terms of the current most predominant groups amongst one-person households and fastest growing groups, the analysis found that single males aged 35-44 are likely to have the largest ecological footprint (Table 2). Single males aged 35-44 also consume more energy, household goods and live in larger units than an average one-person household. Significantly this group is also the most affluent.

<table>
<thead>
<tr>
<th></th>
<th>average</th>
<th>single 35-44</th>
<th>soph 65+</th>
<th>widowed</th>
<th>single married</th>
<th>never widowed</th>
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<tr>
<td>Annual energy consumption per capita (kWh)</td>
<td>14197</td>
<td>16073</td>
<td>14175</td>
<td>13380</td>
<td>7868</td>
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<tr>
<td>Floor space per capita (sqm)</td>
<td>67</td>
<td>72</td>
<td>68</td>
<td>62</td>
<td>28</td>
<td></td>
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<tr>
<td>Weekly expenditure on household goods per capita (£)</td>
<td>25</td>
<td>25</td>
<td>18</td>
<td>19</td>
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Source: Williams [10].
The analysis suggested a strong positive relationship between domestic resource consumption and income. Thus it seems that if affluence amongst one-person households increases in the future (as current trends suggest) so too could domestic resource consumption amongst the group. However, there are conflicting arguments relating to how consumption patterns alter with rising levels of affluence. For example Durning [11] argues that increasing affluence will result in “greener” consumption as households buy more environmentally-friendly products. Rothman [12] argues that there is no evidence to support this suggestion and that consumption will continue increase as affluence grows. Ropke [13] suggests that patterns of consumption will alter as affluence increases and that the share of spending will switch from food (in lower income groups) to housing and transport (in higher income groups). This was supported by the analysis conducted by Williams [10] which showed that singles (who tended to be less affluent than the other groups studied) tended to consume considerably less space and energy but spent more on household goods than the other more affluent groups (Table 2). The findings from the research conducted by Williams, Rothman and Ropke suggest that if affluence amongst one-person households increased the group’s spending on resources (and more especially housing and energy) is also likely to increase. However more research is needed to determine the environmental outcome of increasing affluence amongst the group. Overall these findings suggest that the UK government needs to consider the environmental implications of growth in one-person households (particularly as affluence increases amongst the group) and introduce policies to manage the impact.

3 The Government response

The Government recognises the link between increase in one-person households and increase in domestic energy and land consumption, greenhouse gas emissions and waste production. However, there are no policies that are specifically aimed at reducing consumption amongst smaller households or increasing household size (both of which are unlikely to be politically popular). General national targets have been set to reduce municipal waste going to landfill and greenhouse gas emissions from all sectors. The Government has also set national targets for the domestic sector, for reducing carbon consumption and increasing waste recycling. National targets have also been set for the development of new housing on existing brown field sites or recycling existing properties. Targets have also been set to increase residential densities (between 30 and 50 dwellings per hectare net). Overall Government policies and investment reflects a preference for recycling (e.g. waste and land), re-use (waste and land), recovery (energy) of resources or use of renewable resources (energy) rather than minimisation through the introduction of consumption controls (as it might slow economic growth and reduce international competitiveness).

Environmental targets create the stimulus for policy creation and release of funds needed to achieve the environmental goals set. The Government has introduced national targets for carbon savings and waste, but land supply targets
do not exist. Land supply for housing is controlled to an extent through the planning system. Local planning authorities determine the location of new development, the scale and residential densities. Housing capacity studies completed by local planning authorities identify the sites available for redevelopment and should in theory control the land released for housing. However, in reality the market still largely dictates the quantity and type of accommodation built. Land supply is finite and particularly restricted in the UK. Thus it is very important that land supply targets are introduced to curb the market and protect the resource, especially with the growth in demand for housing that has been predicted. A national land use strategy is needed to identify and co-ordinate the environmental, economic and social goals for development and control the consumption of resources. This would provide the basis for national land targets for all forms of development including housing. In line with national land targets more stringent housing density targets should also be implemented that truly reflect the finite nature of the resource.

Finally, there are no policies or targets that specifically deal with the resource implications of a growth in one-person households generated by inefficiencies and increasing affluence. However, the economic cost of resources tends to restrict consumption amongst one-person households, which is particularly effective currently because of the economic characteristics of the group (i.e. generally low income). Working in opposition to these economic controls are subsidies for one-person households (e.g. reduction in council tax and fuel payments for older one-person households). Econometric predictions suggest that one-person households will become more affluent in the future which may lead to an increase in consumption. In order to ensure more efficient use of resources amongst the more affluent groups it is important that the environmental cost of living alone is truly reflected by the economic cost. Thus subsidies will need to be removed and the environmental costs of all resources will need to be more accurately reflected in the price. However, the economic diversity of the group means a variety of policies will be needed that encourage the affluent to be more resource efficient whilst ensuring low income households have reasonable living conditions.

4 A time for change

The resource inefficiencies arising from the growth in one-person households need to be addressed urgently at a policy level. Numerous policies will need to be evaluated in order to tackle the resource issue. Set out below are some possible policy solutions any of which would require considerable research prior to implementation if they were to be successful. Taxation can be used to internalise the environmental cost of living alone or of resource consumption and waste production. More direct fiscal mechanisms to deal with under occupancy and waste production are needed. Currently the cost of household waste collection is incorporated into the council tax and set at a fixed rate regardless of the quantity of waste collected. This system is far from transparent. Charges for refuse collection by volume would make the system more transparent and
encourage waste minimisation and recycling. An occupancy tax could be charged to households living in under-occupied dwellings to encourage them to move to smaller properties. This would reduce the land, materials and energy inefficiencies generated by under-occupancy. A greater supply of smaller accommodation would be needed to enable the tax to be successful. The introduction of the tax could also encourage the formation of larger peer-shared households. New housing designs and forms of tenure will be needed to accommodate this trend. A relocation package is already in place to tackle under-occupancy in the social sector housing but not for private sector housing where the major problem exists. Similar relocation schemes funded by Government to encourage lower income households in the private sector to move into smaller properties could also be introduced. An alternative to introducing a separate occupancy tax would be to reform the way in which the council tax is assessed (i.e. based on property value only). The reformed tax would be calculated on the basis of household income, occupancy and property value which would better reflect the environmental impact of the household. It could also produce a more equitable charging system by taking into account households income and therefore ability to pay. These taxes could be introduced by local authorities using the information and infrastructure currently used for calculating and collecting income and council tax. Such taxes are likely to be particularly unpopular with more affluent smaller households. However, the proceeds could be recycled to fund the infrastructure and schemes needed (i.e. relocation packages, provision of waste recycling and recovery facilities) to support the behavioural changes needed to produce the desired outcome (i.e. less waste going to landfill and greater resource efficiency).

The need to conserve land has been largely overlooked by Government. The creation of a national land use strategy and the introduction of land targets could be used to restrict the consumption of this valuable resource. Housing allocations could be based both on brownfield and overall land targets. The targets could be monitored and enforced through the national land use database and planning system thus minimising costs of implementation and monitoring. Building regulations and subsidies could be used to encourage greater innovation in terms of environmental design. Higher land values may restrict growth in the construction industry itself and economic growth more generally. The number of units built does not necessarily diminish with the introduction of land targets, as densities could increase together with numbers of smaller units. Existing stock could also be recycled to provide alternative accommodation that better reflected the needs of smaller households. This could be further encouraged through the introduction of more stringent density targets for residential development. Appropriate density thresholds would need to be researched based on social and environmental criteria.

New and existing stock needs to be resource efficient and suitable for smaller households. Legislation and funding streams already support energy efficiency in new and existing stock. New techniques are being used to reduce the environmental impact of the construction and refurbishment processes. In both the private and social sectors new housing is also becoming more space efficient.
But there is still a lack of one-bedroom stock available in the private sector. However, there appears to be an over supply of one-bedroom units in the social sector with insufficient numbers to fill the units (OPDM [14]). The higher density requirements and alternative lifestyles now emerging mean that there will be a need for more innovative design in existing and new housing stock in the future to address current resource inefficiencies. For peer-shared households the recent introduction of common-hold as a legitimate form of tenure in the UK may increase the ease of buying and selling property that is owned by a group of unrelated individuals, which could increase the potential for ownership and investment in this form of accommodation. Demonstration projects and funds for research and development could be provided by Government to encourage the development of the new design solutions and research potential markets. This would provide house-builders with the opportunity to innovate and help to generate markets for new housing forms. It would also enable house builders to develop expertise and experience that may help increase their competitiveness outside the UK.

In the short-term fiscal policy, design solutions, legislation and targets are likely to be the most successful instruments for change. However, longer-term there will need to be a profound cultural shift towards greener consumption patterns (i.e. a reduction in consumption and consumption of more environmentally friendly products). Education provides an instrument, through which these long-term changes might be achieved, by providing people with the information that enables them to understand why change is needed and how it can be best achieved. A programme to raise awareness of the environmental impacts of under-occupancy and benefits of greener household consumption is needed for all households. It would be useful to direct a specific campaign at one-person households to make them aware of their particular impact and provide them with greener lifestyle options that particularly reflect their needs and preferences.

5 Conclusions

In conclusion, the growth in one-person households is potentially a resource time bomb. The rapid growth in household numbers, resource inefficiencies and increasing affluence amongst one-person households make the group potentially a major resource consumer and waste producer. More research is needed to determine the future levels of affluence and consumption patterns amongst the group in order to estimate its impact more accurately as these estimates are extrapolated from current trends. The Government has recognised the potential environmental implications of the growth in one-person households but is yet to introduce any specific policies to tackle the problem. This paper presents some possible instruments for reducing the environmental impact of the domestic sector. All of these would require considerable research prior to their adoption as would any similar policies aimed at defusing the resource time-bomb identified in this paper.
References


