



## Linked lives and the implications for health and social care

### Introduction

The UK's population is ageing, which means that increasing demands will be placed on our health and social care systems. Most social care is currently provided informally, by family members. Formal care (e.g., living in a care home) can be a big financial burden, on either families or the state. It is therefore prudent to consider how our future social care needs are going to be met. With this in mind, the Care Life Cycle project brings together demographers, gerontologists, operations researchers, and computer scientists to look at the UK's health and social care landscape and how it will be affected by the changing demographics of a 21st century population.

This briefing paper introduces a computational model of the demographic processes that affect the supply of, and demand for, social care. We represent individual people and events in a process known as agent-based modelling. The agent-based approach is used to capture the idea of “linked lives”. In other words, no-one is an island. Whether we will be in a position to receive informal social care from our family members when we are 80 depends on the state of our family network; it depends on the attitudes we have and the decisions we make over our lifespans regarding partnership, children, divorce, migration, etc. Agent-based simulation allows us to capture aspects of these linked human lives that are impossible to express in more abstract modelling approaches.

### The Model

We want to help policymakers understand the range of possible future scenarios, especially in terms of the balance between informal, privately funded, and state-funded social care. We also want to know which of the available policy levers are likely to be effective in steering the system towards preferred outcomes. Our model allows us to calculate the expected tax burden of state-funded social care under different sets of assumptions.

We simulate the UK's population with one agent standing in for 10,000 people. For each agent, we track their age and sex; their health status and resulting care needs; their partner (if any); where they live; the locations of their parents, siblings, and children; and their work status (e.g. retired).

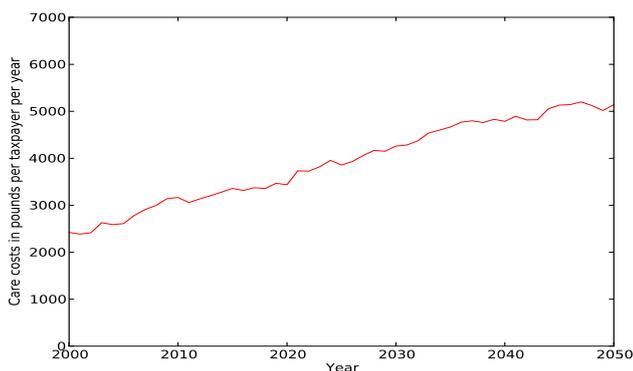
### Key Points

- The UK's social care needs are increasing due to an ageing population.
- Agent-based modelling provides a way to capture the “linked lives” aspect of the care landscape.
- Models indicate that the tax burden of state-funded social care may double by 2050.
- Simulation provides a “policy sandbox” to explore responses to the problem.

The simulation runs from the year 2000 through to 2050, and we use demographic data to simulate events such as births and deaths, marriages and divorces, house moves, health status changes, etc. We assume that people who live with (or close to) healthy family members will get the care they need, assuming those family members have sufficient time available to deliver the required care. We also assume that the state will step in to cover the costs of anyone who is not receiving the level of care they need (e.g., someone with no surviving family members).

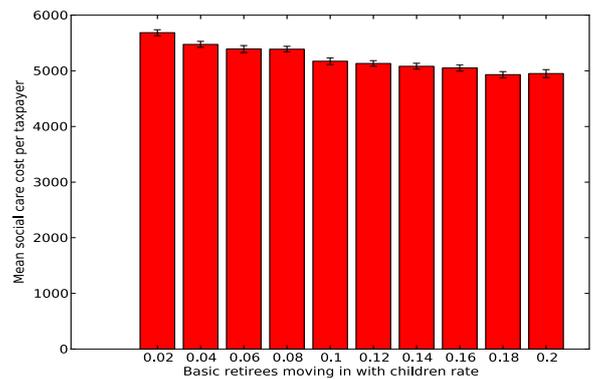
### Results

Our central prediction is that the overall demand for social care will approximately double by 2050. Due to changing family structures, not all of that care need will be met informally. There is also likely to be a dramatic increase in the per-taxpayer cost of state-funded social care, as shown in the figure below.



Our approach means we can treat the average cost of state-funded care in 2050 as an outcome variable, and examine the projected effect of different assumptions or different policies. For example, in any one year, how likely is it that a widowed or divorced retiree will move back in with one of their children? This probability might be increased by policy initiatives such as a tax break on building a self-contained flat attached

to a family home. Could an increase in this rate alleviate the burden on taxpayers by making it more likely that people will receive care from family members and not the state? The graph below shows that in fact, for annual probabilities between 2% and 20%, this variable does not make a great deal of difference. We would probably be better off focusing our policy efforts elsewhere in this instance.



### Future research

For our model to work as a “sandbox” for policy exploration, we need to capture all of the relevant aspects of UK life. The simulation is therefore being extended in multiple ways. For example, we are looking in more detail at the time budgets of our simulated people, including factors such as child care and transport, in order to more accurately reflect the time they have available to provide care to others. The economic status of the agents will be handled in more detail: an individual’s income and assets are important in determining whether they will be able to pay for formal care. Finally, we want to look at more than just the financial implications of social care so we will be measuring the quality-adjusted life years of our agents as a way of indexing human happiness. Please contact us if you would like further information on the Care Life Cycle project, via email to [clcproj@soton.ac.uk](mailto:clcproj@soton.ac.uk) or telephone 02380 598981.

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