

The analysis was performed using Stata 15. We started with the descriptive analysis and using locally weighted regression (LOWESS) to gain insights into the functional relationship between care use and BMI.

The main models were estimated to account simultaneously for a range of outcomes, including the various types of long-term care support, no support, non-response and death:

$$\ln\left(\frac{p_{itj}}{p_{it1}}\right) = \beta_{0j} + W_{it-1}\beta_{1j} + X_{it-1}\beta_{xj} + \varepsilon_{it} \quad (1)$$

For person  $i$  at time (wave of the ELSA survey)  $t$ ,  $p_{itj} = \text{prob}(y_{itj}|X_{it-1}, W_{it-1})$  is the probability that the individual experiences outcome  $j$ . In the baseline specification,  $j$  includes (i) any type of care, (ii) non-respondent and (iii) dead. In the extended specification,  $j$  includes (i) informal care, (ii) informal and privately purchased care and (iii) formal care (care home and LA social care), (iv) non-respondent and (v) dead. The base category in both models is no use of care. We exploited the longitudinal nature of the data (ELSA has waves 2 years apart) in an attempt to mitigate any contemporaneous bias from unobserved confounding factors that have a short-term term effect (for example, a person's current level of self-confidence, which is unobserved, might affect both the need for LTC and obesity in the current period, but is less likely to be correlated with past obesity). As such in this analysis, the person's care use in the current period  $t$  is specified to depend on their obesity status,  $W_{it-1}$ , and the other controls,  $X_{it-1}$ , as measured in the previous period (wave). Appendix B provides details on setting up the econometric model and strategy of dealing with bias in more detail.

These models were estimated using multinomial logit. Standard errors were clustered at the individual person level. As a robustness check, to account for the unobserved time-invariant individual effects, we also estimated an alternative specification with a quadratic function in BMI using the unobserved effect logit model (xtmelogit in Stata).