Step 1: Obtain sample survey microdata and small area constraints

Survey microdata

Household	Characteristics		
	size	adults	children
(a)	2	2	0
(b)	2	1	1
(c)	4	2	2
(d)	1	1	0
(e)	3	2	1

Known small area constraints [Published small area census tabulations]

1. Household size (persons per household)

Household size	Frequency
1	1
2	0
3	0
4	1
5+	0
Total	**2**

2. Age of occupants

Type of person	Frequency
adult	3
child	2

Step 2: Randomly select *two* households from survey sample [(a) & (e)] to act as an initial small-area microdata estimate

Step 3: Tabulate selected households and calculate (absolute) difference from known small-area constraints

Household size	Estimated Frequency (i)	Observed Frequency (ii)	Absolute difference | (i)-(ii) |
1	0	1	1
2	1	0	1
3	1	0	1
4	0	1	1
5+	0	0	0
		Sub-total:	*4*

Age	Estimated Frequency (i)	Observed Frequency (ii)	Absolute difference | (i)-(ii) |
adult	4	3	1
child	1	2	1
		Sub-total:	*2*

Total absolute difference = *4 + 2* = **6**

Step 4: Randomly select one of selected households (a or e). Replace with another household selected at random from the survey sample, provided this leads to a reduced total absolute difference

Households selected: (d) & (e) [Household (a) replaced]

Tabulate selection and calculate (absolute) difference from known constraints

Household size	Estimated Frequency (i)	Observed Frequency (ii)	Absolute difference | (i)-(ii) |
1	1	1	0
2	0	0	0
3	1	0	1
4	0	1	1
5+	0	0	0
		Sub-total:	*2*

Age	Estimated Frequency (i)	Observed Frequency (ii)	Absolute difference | (i)-(ii) |
adult	3	3	0
child	1	2	1
		Sub-total:	*1*

Total absolute difference = *2 + 1* = **3**

Step 5: Repeat step 4 until no further reduction in total absolute difference is possible:

Result: Final selected households: (c) & (d)

Household size	Estimated Frequency (i)	Observed Frequency (ii)	Absolute difference | (i)-(ii) |
1	1	1	0
2	0	0	0
3	0	0	0
4	1	1	0
5+	0	0	0
		Sub-total:	*0*

Age	Estimated Frequency (i)	Observed Frequency (ii)	Absolute difference | (i)-(ii) |
adult	3	3	0
child	2	2	0
		Sub-total:	*0*

Total absolute difference = *0 + 0* = **0**

Figure 1 A simplified combinatorial optimisation process