Exercises on AF Methodology

Exercise 1

Given the following matrix of distribution of four dimensions (income, years of education, BMI and access to clean water) and respective poverty lines:

$$X = \begin{bmatrix} 6 & 3 & 18 & 1 \\ 8 & 4 & 20 & 1 \\ 12 & 6 & 17 & 0 \\ 20 & 8 & 16 & 1 \\ 5 & 3 & 16 & 0 \end{bmatrix}$$

$$z = [10 \quad 6 \quad 18.5 \quad 1]$$

a) Calculate the raw dimensional headcounts.

Assume the four dimensions are weighted equally.

b) Compute the deprivations count vector (ci vector).

c) Calculate H, A and M0 assuming an union approach (k=1) and an intersection approach (k=4). Interpret the results.

Now, assume a poverty cut-off k=2

d) Calculate H, A, and M0.

e) What is the censored headcount ratio in each indicator and what does it mean? How does each differ from the 'raw' censored headcount?

f) What is the contribution of each dimension to M0?

Assume that the first three people (3 first lines of X) are women and the last two are men.

g) What is the contribution of women to overall poverty? Interpret the results.

h) Suppose individual 1 became deprived in water. How would that affect H and M0? (You can verify your results by computing the new results).

i) What would happen to H and M0 if individual 1 would experience an income loss?

Assume income and education have a weight of 1.5, and BMI and water have a weight of 0.5.

j) Calculate H, A and M0. (Consider original X matrix.)

Some useful steps for calculation:

1. From the achievement matrix, build the deprivation matrix
2. Build the 'weighted' deprivation matrix
3. Compute the deprivation score for each individual
4. Determine whether each individual is poor or not according with your selected k-value
5. Define the weighted censored deprivation matrix
6. Now you are ready to compute M0: it is just the mean of the weighted poverty matrix.

Exercise 2

Given the following matrix of distribution of three dimensions (income, self-rated health and years of education) and respective deprivation lines:

$$X = \begin{bmatrix} 4 & 1 & 5 \\ 8 & 4 & 6 \\ 12 & 1 & 11 \\ 3 & 4 & 6 \\ 15 & 1 & 9 \\ 12 & 5 & 12 \end{bmatrix}$$

$$z = \begin{bmatrix} 10 & 3 & 8 \end{bmatrix}$$

a) Calculate H, M0, M1 and M2 using a cut-off value of k=2 and equal weights.
   1. Which is the contribution of each dimension to M0?
   2. Which is the contribution of the group of the first three individuals to overall M1?
   3. What happens to each of the measures if individual 2 reported a health status of 2 instead of 4?
   4. What happens to each measure if individual 2 reported an income of 4 instead of 8? (Consider original X matrix.)

b) Calculate H, M0, M1 and M2 using nested weights: assigning value of 2 to income, and 0.5 to health and education respectively.