Problem set on Multidimensional Poverty Measures – Alkire & Foster’s Measures

I. Paper-Based Exercise on AF Measures

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

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

\[
z = \begin{bmatrix}
10 \\
3 \\
8
\end{bmatrix}
\]

a) Calculate \(H, M_0, M_1\) and \(M_2\) using a cutoff value of \(k=2\) and equal weights. Assume that poverty lines are (10, 3, and 8 correspondingly).

1. Which is the contribution of each dimension to \(M_0\)?

2. Which is the contribution of the group of the first three individuals to overall \(M_i\)?

3. What happens to each of the measures if individual 2 reported a health status of 2 instead of 4?

b) Calculate \(H, M_0, M_1\) and \(M_2\) using nested weights: assigning value of 2 to income, and 0.5 to health and education respectively.