Choice of the aggregation methodology for the AAI

Back

3.1 Introduction

A careful review of existing index construction methodologies has been undertaken in the preparation of work

towards constructing the AAI (e.g. UNDP 1990; Akder 1994; Anand and Sen 1995, OECD 2008, Bradshaw and Richardson 2009; Klasen and Schüler 2011; and Kaneda *et al.*, 2011). Initially, a choice had been made in favour of using the z-score methodology, as in Bradshaw and Richardson (2009). The major advantage of the z-score methodology has been that it allowed for the standardisation of indicators of different types and scales around the sample mean. Thus, using this method, indicators measuring the share of the population and those reported in other measurement units (such as years in life expectancy indicators) were conveniently expressed as a standardised deviation from the mean, rendering them comparable and thus aggregating them in a single index, as the arithmetic means of the z-scores.

While the z-scores methodology provided a convenient way to normalise results, by anchoring them around the mean, this also rendered comparisons over time more difficult without additional transformations of the data. This is for the fact that indicators referring to the time t+1 in the future will be standardised around the mean values observed in t+1, which if significantly different from the present time t, will make them temporally incomparable with the present. The AAI_{t+1} will then rank countries according to the new reality in terms of active ageing observed in t+1.

During the second Expert Group meeting, and also in subsequent discussions with the project partners, it was decided that the methodology adopted in the aggregation of the selected active ageing individual indicators to the domain-specific and to the overall AAI should be similar to that used in the HDI of the UNDP.

Moreover, in light of substantial gender differentials in the different aspects of active ageing in Europe (e.g. on employment rates, in engagement of care provision activities and life expectancy and health outcomes in later stages of life) and for the importance of gender-targeted policy actions for EU policy makers (for example, in the context of EU 2020 targets), it was decided that the AAI will also be disaggregated by gender. The decision for creating a separate index for men and for women was also motivated by such practices in other contexts (see for example Klasen and Schüler 2011; and Permanyer 2011), also on the basis of discussions with the Expert Group and the initial analysis of individual indicators. Thus, the methodology described below applies to the overall AAI as well as to the gender-specific indices.

Note also that the missing values (if any) are not imputed as each available method for statistical imputations carried their own methodological limitations and imputation could restrict the credibility as well as the comparability (across space as well as inter-temporally) of the AAI. The approach used allows us to point out those fields of missing data where data collection is highly desirable in the countries in question.

3.2 Description of the methodology

The methodology chosen in the constructing the AAI should reflect a transparent method to present the dashboard of indicators of active ageing. The 22 indicators selected are aggregated to the AAI by following four methodical steps:

1. First, all active ageing indicators are expressed as positive indicators, taking on a positive normative judgement meaning that the higher the value, the better the active ageing outcome. For instance, the financial security indicator of at-risk-of-poverty is expressed in terms of no poverty risk. The indicators capturing the care provision by older people are considered positive because of the emphasis on the value of the care provision for the society.
2. Second, each of the indicators is expressed in percentage terms, with a lower goalpost of 0 and an upper goalpost of 100. Note here that the assumption of the upper goalpost of 100 cannot always be interpreted as the optimum, as it implies the unlikely utopian target of fullest possible active ageing. Thus, for example, the target goalpost of the employment rate indicator for older workers is assumed to be full employment.
3. Third, for each domain, the arithmetic weighted average of the indicators is calculated. Note here that the resulting domain-specific indices are made up of a different subset of indicators (as is obvious from the description in Box 3). These results then give us four gender-specific indices, one for each domain, namely: Employment domain index; Participation-in-society domain index; Independent-healthy-and-secure-living domain index and the capacity-and-enabling-environment-for-active-ageing domain index.
4. Finally, the overall aggregated indicator is then calculated as the arithmetic weighted average of the domain-specific indices. The final explicit weights used for the four domains are, respectively, 35, 35, 10 and 20 for four domains (see Box 4 for more details, in particular the difference between the explicit and implicit weights). These weights and also those used in Step 3 are drawn from the recommendations of the Expert Group (Table 3.1 gives the value of explicit and implicit weights assigned in the aggregation of indicators to a domain-specific index, and subsequently the weights assigned for each domain in aggregating the domain-specific indices to construct the overall AAI).

One critical issue has indeed been that of weighting. In the absence of unequivocal theoretical and empirical grounding on the contribution of each indicator to a certain domain and of each domain to active ageing, it was decided to use weights recommended by the Expert Group (see Box 4 for more discussion).

The important consideration is that there are also implicitly different weights attached to indicators and to domains, as determined by the relative size of the indicator value and the domain-specific index value, respectively. It is for this reason that the impact of any indicator on the domain, and that of the domain-specific index on the overall AAI, have been analysed very carefully, and the final choice of explicit weights has been calibrated, to meet the recommendations of the Expert Group for the weighting.

Table 3.1: Weights (explicit and implicit) assigned to individual indicators and domains

Indicators / Domains	Explicit weight for an indicator (proportion within the domain)	Explicit weight for a domain	Implicit weight for indicators and domains
Employment rate 55-59	25%		58%
Employment rate 60-64	25%		27%
Employment rate 65-69	25%		10%
Employment rate 70-74	25%		5%
1st domain: Employment	100%	35%	28%
Voluntary activities	25%		19%
Care to children, grandchildren	25%		46%
Care to older adults	30%		22%
Political participation	20%		13%
2nd domain: Participation in society	100%	35%	19%
Physical exercise	10%		2%
Access to health and dental care	20%		26%
Independent living	20%		24%
Relative median income	10%		12%
No poverty risk	10%		13%
No material deprivation	10%		13%
Physical safety	10%		9%
Lifelong learning	10%		1%
3rd domain: Independent, healthy and secure living	100%	10%	21%
Remaining life expectancy of 50 at 55	33%		37%
Share of healthy life expectancy at 55	23%		22%
Mental well-being	17%		19%
Use of ICT	7%		4%
Social connectedness	13%		12%
Educational attainment	7%		6%
4th domain: Capacity and enabling environment for active ageing	100%	20%	32%

Note also that the gender-specific indices (for the domains, and also AAI_{female} and AAI_{male}) are constructed taking into consideration the values for the gender-specific indicators, but using the same weights as for the total population. A calculation of this sort makes it easier to analyse the disparity between men and women. Also, differences between the gender-specific AAIs refer to gender differences within countries and not to differences across country for one particular gender. If the AAI_{gender} for each country is compared to the AAI_{gender} of the top performing country, this would provide a picture of how good/bad for example women in country A are in comparison to women in a benchmark country, and not only in comparison to the male counterparts in their own country.

BOX 4
WEIGHTING METHOD USED IN THE CONSTRUCTION OF THE AAI

An important element of the AAI methodology is the choice of weights to be assigned to individual indicators when aggregating indicators to a domain-specific index (and, likewise, weights to be assigned to individual domains when aggregating domain-specific indices to the overall AAI). Previously, the AAI results were produced using equal weights for all indicators within each domain and equal weights for all domains in the AAI. This method was preferred for the fact that it involved no value judgement of researchers to uphold the relative importance of a domain, or an indicator within a domain. However, this equal weighting method came under scrutiny during the 2nd Expert Group meeting, and subsequently a number of decisions were made to revise the weighting methodology used in the construction of the AAI:

- It was agreed that different explicit weights must be considered for different domains of the AAI, and also for different indicators within a domain.
- It should be taken into account that indicators with higher values have an implicitly greater weight to the domain-specific index, and vice versa. Likewise, the domain with a higher value of the index will carry implicitly higher weight to the overall AAI, and vice versa.
- Members of the Expert Group were requested to carry out a weighting simulation exercise using the Excel sheet containing AAI results. In the week following the 2nd Expert Group meeting, the AAI team received 10 recommendations, from the Expert Group as well as from the project partners, specifying what should be the weight for each domain and for each indicator within a domain.

Upon the recommendations, it was essential to make a distinction between 'explicit' and 'implicit' weights (whose values are reported in Table 3.1).

- **Explicit weights:** These are the final set of weights assigned to individual indicators and domains. They are obtained after assuming an initial value of explicit weights and then re-adjusting them so that the values of the resulting **implicit weights** match with those recommended by the experts.
- **Implicit weights:** The implicit weight for an indicator is obtained by multiplying the value of explicit weight with the value of the indicator when aggregating the indicators to a domain-specific index; likewise, the implicit weight for each domain is derived from a multiplication of an explicit weight for the domain and the value of the domain-specific index.

The differences between explicit and implicit weights can be best understood by looking at the relative weights assigned to the 1st and 2nd domain. The final explicit weight for both the 1st and the 2nd domain are set at 35% each. However, these equal weights for the first two domains are the outcome of the calibration that was essential given the relatively low values of the 2nd domain index. The end result is the equal explicit weight but the implicit weights are 28% and 19%, respectively for the 1st and 2nd domains, and they are in line with the recommendations of the Expert Group.

Thus, to reiterate, the implicit weights for each indicator/domain were estimated as a multiplication of the explicit weight and the indicator/domain value. The value of the explicit weight is calibrated so that the chosen final implicit weights match with those recommended by the Expert Group. Note also that collinear indicators would also imply double weighting for a given domain, but an analysis of the correlation of indicators within domains assured that this was not the case (see sensitivity analysis undertaken in Zaidi et al. 2012).

The methodology employed for the calculation of the AAI presents some notable advantages for the purpose of measuring the active ageing phenomenon in European countries. Most importantly, it allows for the AAI to be displayed in an appealing manner by informing policy makers about the untapped potential of older people observed in their country. In this way, countries can be compared on how they fare in achieving active ageing outcomes, but it is also possible to disaggregate the AAI into the contributions of each domain to the final score, thus showing which domains should merit specific actions from public policies. In the end, the decisive argument in favour of this aggregation method was the numerical interpretation of the index for a wider audience which was not possible in other methods (e.g. as in the z-score methodology used previously in constructing the AAI; for details, see Zaidi et al 2012).

The measure of gender differences makes it possible to compare gender equality in the overall AAI within each country, but also how equal women are in comparison to men in each of the four domains. However, it is limited to the comparison of men and women within a country and does not account for the relative position of each to an overall benchmark value. For each domain and for the AAI, indicators are arithmetically averaged. This means that the relative good performance of a country in one domain may offset the relative worse performance in another.