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An equity benchmark for SDG 4: two options for discussion, proposed to the Technical Cooperation Group

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This proposal is based on the assumption that the SDG4 indicator 4.5.1 needs to measure equity, not just equality in educational pathways and outcomes. This means that it should be able to show how equally education is distributed between different populations according to their sex, wealth or location, and not only across persons regardless of their different circumstances. As stated in Shafritz & al. (2017), *Introducing Public Administration*,

> "Social equity is […] the principle that each citizen, **regardless of economic resources or personal traits**, deserves and has a right to be given equal treatment by the political system." (p. 469).

For many SDG4 indicators expressed as rates, it is possible to disaggregate the results for specific groups of interest – at least by sex and, in some cases, also by other characteristics such as wealth and location. Thus, it is possible to obtain the rates for subgroups of interest (women and men, and sometimes individuals living in rural and urban areas, or those belonging to an economically disadvantaged and advantaged category) who present a certain characteristic such as meeting a threshold of competence on an assessment. The relation between such disaggregated rates can be computed differently.

The current SDG4 databases and analyses present parity indexes (PI), expressed as ratios of the indicator value for one subgroup to that of the other; typically, the likely more disadvantaged subgroup is the numerator. However, parity indexes have a major drawback. The comparison between two PIs leads to inconsistent findings depending on whether the presence or the absence of a given characteristic is taken into account. Let us take the example of two gender-based subgroups (women and men), where, in the first case, 80% of women and 90% of men reach a given level of skills and, in the second case, 30% of women and 40% of men. The differences in terms of equity relying on PIs vary according to the measure of achievement of the skill threshold. When considering *reaching* the threshold, inequity is higher in the second case ($PI_{2,R}$ is more far away from 1 than $PI_{1,R}$). When considering *not reaching* the threshold, inequity is higher in the first case.

$$PI_{1,R} = \frac{W1\ (0.8)}{M1\ (0.9)} = 0.89 \qquad PI_{2,R} = \frac{W2\ (0.3)}{M2\ (0.4)} = 0.75$$

$$PI_{1,NR} = \frac{W1\ (0.2)}{M1\ (0.1)} = 2 \qquad PI_{2,NR} = \frac{W2\ (0.7)}{M2\ (0.6)} = 1.17$$

Therefore, the use of PIs, whatever their values, distorts the findings on the comparisons between countries, for a given year. It also distorts the evolution of equity over time, for a given country: in this case, if the PI_2 is the index in a given year and PI_1 the index in another year, the change from value to the other gives an idea of that evolution which is not the same according to the way the skill-achievement is measured (inconsistency problem).

Two options may be proposed to solve this problem, with some advantages and disadvantages (see the synthetic table below).

The first would be to compute equity as a ***gap (G) between the rates corresponding to the subgroups of interest***:

$$G_1 = M_1(0.9) - W_1(0.8) = 0.1 \qquad G_2 = M_2(0.4) - W_2(0.3) = 0.1$$

This option answers the problem of inconsistency in terms of equity between countries or between different points in time within a single country. Moreover, the result is easy to compute and to interpret. It may be relevant to prefer subtracting, by construction, the presumably disadvantaged group from the presumably advantaged group, in order that the gap be expressed through positive values. The main drawback is a ceiling effect coming from the fact that neither the PI nor the gap can be higher than 1.

The second option is to compute equity through ***odd ratios (OR) between the rates within each subgroup of interest:***

$$OR_1 = \frac{M1\,/(1-M1)}{W1/(1-W1)} = \frac{0.9\,/0.1}{0.8/0.2} = 2.25 \qquad OR_2 = \frac{M2\,/(1-M2)}{W2/(1-W2)} = \frac{0.4\,/0.6}{0.3/0.7} = 1.56$$

The result corresponds to the ratio between the relative probabilities of a certain characteristic to occur within each subgroup of interest. In the given example, men are 2.25 times more likely than women to present a characteristic than not to present it in the first case and only 1.56 times more likely in the second case. This option answers the problem of differences in PIs depending on whether the subgroups are defined by the absence or by the presence of a certain characteristic. It also presents the advantages of always being expressed as a positive value (greater than or equal to zero; the value 1 corresponding to parity) and not being constrained by a ceiling effect. The main drawback is its rather complex wording, as it states relative positions.

The choice between the two indicators (gap between rates or odd ratios) must be made while keeping in mind that they provide different views of the same situation. Due to the ceiling effect, the increase in global rates of skill-threshold achievement in a country (from the examples above) somewhat mechanically reduces the gaps between groups (here: men and women), but it also means a real decrease in number of people concerned. Odd ratios are not sensitive to this effect, by construction. Conversely, they can show significant levels of inequity in countries with rates close to 100%. These levels are more difficult to interpret and also more sensitive to measurement errors since they rely on small variations in the numbers of people concerned. In every case, caution is required while using inequity measures: both the equity-related values and the overall means should be observed, in particular through graphical presentations.

To simplify and summarize our proposal below, the proportion of children at a certain level of education achieving at least a minimum proficiency level in a certain domain is taken as a basis on the indicator side.

OPTION	BENCHMARK SETTING	ADVANTAGE	DISADVANTAGE
Gap (G)	Data disaggregated by sex in many assessments. Other groups of interest (wealth, location) available in some assessments.	Easy to compute. Easy to interpret. No problem of inconsistent statements on equity depending on whether the subgroups are defined by the absence or by the presence of a certain characteristic.	As in the case of parity indexes: ceiling effect (≤1).
Odd ratio (OR)		Easy to compute. Only positive values (≥0). No ceiling effect. No problem of inconsistent statements on equity depending on whether the subgroups are defined by the absence or by the presence of a certain characteristic.	Difficult to interpret. Can give very high levels of inequity when rates for subgroups are close to 100 %.