Towards a taxonomy for social impact pathway indicators

Bo P. Weidema

Aalborg University, Danish Centre for Environmental Assessment, Rendsburggade 14, 9000 Aalborg, Denmark

bweidema@plan.aau.dk

Abstract. A conceptually complete taxonomy is proposed at three levels of the impact pathway: Elementary flows, midpoint impacts, and endpoint impacts. The completeness is ensured conceptually by including unspecified residuals and by the use of fully quantifiable indicators that can be traced from source to sink, so that completeness can be verified by input-output balances and against measured totals. Each category in the taxonomy has a definition and at the lowest level also a unit of measurement. Examples of category definitions and units are illustrated in an impact pathway model with starting point in the midpoint impact category "Undernutrition". This model also demonstrates the role of the taxonomy in the development of characterisation factors.

1 Introduction

The purpose of taxonomy is to provide structure and conceptual clarity to a scientific domain through clear definitions of hierarchically organised concepts. By reducing confusion and supporting harmonisation of terminology, the ultimate purpose is to improve monitoring, knowledge-generation, and decision-making. For social impact pathway indicators an important aspect of this is to ensure consistency in modelling, so that similar impacts are treated in a similar way.

Social impacts are here understood in the wider sense of welfare economics, as all impacts that affect human wellbeing, including ecosystem, health and socio-economic impacts.

The concept of impact pathway indicators has its own taxonomy, with the most well-known being the DPSIR framework of EEA [1], dividing indicators in Driving Force, Pressure, State, Impact, and Response indicators. Within the field

of Life Cycle Assessment, as standardised in the ISO 14040 series, the same impact pathway indicators have different names as shown in Table 1. Here, the latter terminology is applied, except for the use of the term "pressure" in the example in Section 7.

Tab.1: Classes of impact pathway indicators in the EEA and LCA

DPSIR [1]	LCA (ISO 14040 series)
Driving force	Functional unit, Reference flow or Intermediate flow (between economic processes)
Pressure	Elementary flow
State	(no parallel, except when describing a baseline, reference, or background situation)
Impact	Impact category endpoint (often shortened to "impact" with indicators divided in *midpoint indicators* and *endpoint indicators*, the latter often classified in *Areas of Protection*)
Response	(no direct parallel; Responses may be formulated as new Functional Units of different improvement scenarios)

Contributions towards a taxonomy for social impact pathway indicators have been made by:

- Jolliet et al. [2], in particular for Areas of Protection;
- Bare & Gloria [3], who presented a very detailed taxonomy, however limited to physical impacts and introducing a concept of "mode of contact" as a midpoint between elementary flows and midpoint impacts, although this did not play a central role in structuring their taxonomy;
- Simões [4], who collected 1450 social indicators from 51 documents from more than 30 scientific journals and classified these into 54 indicator families, further classified according to the 22 social aspects of the Global Reporting Initiative - a classification that is most relevant at the level of elementary flows, but which does not consider the further cause-effect relations required for linking to midpoint and endpoint indicators;
- UNECE [5] providing a very comprehensive set of sustainability indicators and a very clear description of the relationship between these indicators and the national accounting framework, particularly pointing out that for each aspect to be covered, both a geographical (imports/exports) and a temporal (transfer to future generations) perspective need to be covered.

The taxonomy presented here extends these contributions by suggesting a conceptually complete taxonomy at three levels of the impact pathway: Elementary flows, midpoint impacts, and endpoint impacts. The completeness is ensured conceptually by including unspecified residuals, but also and more importantly by the use of fully quantifiable indicators that can be traced from source to sink, so that completeness can be verified by input-output balances and against measured totals.

A distinction between biophysical, economic and social indicators has been maintained at the level of elementary flows, while for midpoint impacts the social and economic melts together as socio-economic indicators. When values are introduced at the level of endpoints (areas of protection), it is no longer meaningful to maintain the distinction between biophysical and socio-economic, even though some impacts can still be measured in physical units.

2 Equity-weighted welfare ("Utility") as single-score endpoint

In accordance with welfare economics, the taxonomy applies equity-weighted welfare (or "Utility" for short) as single-score endpoint indicator. The equity-weighting (also known as utility-weighting, welfare-weighting, or distributional weighting) is necessary to take into account that the same impact is more burdensome (and that a similar improvement is more valuable) for individuals with lower income, and also allows a distinction between the weights given to impacts that directly affect wellbeing versus impacts that affect wellbeing indirectly via changes in productivity [6]. Thus, utility is measured in equity-weighted and purchasing-power-corrected monetary units. When communicating values, the most appropriate unit should chosen, depending on the audience. The use of monetary units for communicating values should be limited to those situations where it is desired by the audience. Single-score results may, e.g., also be expressed in sustainability-points or Quality-Adjusted person-Life-Years. Monetary units are simply preferred for convenience by many decision-makers. The advantage of a single-score endpoint is that it allows explicit trade-offs to be made between the indicators of the different Areas of Protection. The inclusion of a single-score endpoint in the taxonomy does not imply that single-score methods have to be used in order to benefit from the remaining part of the taxonomy.

3 Areas of protection

A conceptually complete organisation of "areas of protection" was suggested by the UNEP/SETAC Working Group on Impact Assessment [2]. Table 2 shows this with a few modifications. What is meant here by conceptually complete is that any item must be either human or non-human; any non-human item must be either biotic or non-biotic; any item must have either intrinsic value (be valuable in itself) or instrumental value (be valuable as a means to an end). What is here called "Instrumental" may also be called "Resources" or "Capital".

In the definition of the WHO [7], human health is "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity", implying that the term also covers human wellbeing in a wider sense. However, in practice, the definition is used in the more narrow sense of mortality and morbidity as reflected in the use of DALY (Disability-Adjusted Life-Years) as a unit of measurement (e.g., in the Global Burden of Disease studies). DALY is also the typical unit used for the human health impact category indicator in most LCIA methods. Some models, especially those including social impact pathways, instead use the unit of QALY (Quality-Adjusted Life-Years), to reflect the wider wellbeing perspective.

Tab.2: Areas of protection in the SETAC/UNEP LCIA framework from [2], slightly modified by Weidema [8] by adding the terms in brackets

Objects considered → Endpoint value ↓	Humans	Biotic environment (natural and artificial)	Abiotic environment (natural or artificial)
Intrinsic	Human health (and well-being)	Biodiversity (and well-being of animals in human care)	Natural and cultural heritage
Instrumental	Human productivity	Ecosystem productivity	Natural resources and man-made capital

The term "endpoint" for the indicators of the areas of protection implies that these are seen as independent and non-interacting. For the impact pathways, this implies that a midpoint impact that ultimately affects more than one endpoint should have an impact pathway to each of these endpoints. For example, a disease will typically both have a pathway to human health and a separate pathway to human productivity (lost workdays and health care costs). When a single-score endpoint is applied, the "areas of protection" endpoints effectively become midpoints towards the single-score endpoint. The use of the term "endpoint" is thus context-dependent.

4 Midpoint impact categories

Midpoint impacts can both affect endpoints and other midpoint impact categories. In Table 3, midpoint impact categories at the two top levels are listed. In the full taxonomy, a third level exists for many midpoint impact categories, and the taxonomy is open for further refinement. For example, the level 2 category "Inadequate maternity support" has a sub-category "Food insecurity" at level 3, defined as "Prevalence of insufficient amount and quality of individual food intake among children and women of childbearing age" and measurement unit: "Dimensionless ratio representing affected fraction of population (prevalence)". Further examples of definitions and units are provided in Section 7.2.

Tab. 3: Top-level midpoint impact categories. Unspecified residuals are indicated with an asterisk (*).

Level 1	Level 2
Biophysical impacts	Acidification
-	Antibiotic resistance
-	Aquatic oxygen depletion
-	Eutrophication
-	Global warming, ecosystem impact
-	Global warming, human impact
-	Human disease from respiratory particulates
-	Human toxicity
-	Other human diseases
-	Other physical impacts*
Socio-economic impacts	Absolute poverty
-	Capital market failure
-	Government failure
-	Human migration, forced
-	Inadequate access to pensions or social security
-	Inadequate maternity support
-	Inadequate conservation of cultural heritage
-	Inadequate social infrastructure*
-	Insufficient health care system
-	Insufficient skills
-	Market distortion, except capital markets
-	Underinvestment in education
-	Underinvestment in health care
-	Underinvestment in natural disaster damage prevention and mitigation
-	Underinvestment in physical infrastructure
-	Unemployment and underemployment
-	Unwanted pregnancy

The majority of the midpoint impact categories in Table 3 are relatively self-explanatory. However, the one named "market distortion" is an aggregate of many more specific midpoint impact categories, and may therefore need to be explained here. It can be differentiated by the more specific nature of inequality of opportunity and transaction conditions (e.g., information inequality, discrimination, trade barriers) and by market (which includes markets for production factors). What is common for all of these is that different market actors are treated unequally or even completely prevented from access to a specific market.

5 Elementary flow categories

For the elementary flows, the top levels (see Table 4) are relatively aggregated, especially for the biophysical pressures, where level 3 (not shown in Table 4) contains 37 categories, and many more, e.g., specific substance emissions, at level 4. For the economic and social pressures, level 3 categories are shown in Table 5. Each flow category has a definition and at the lowest level also a unit of measurement.

Tab. 4: Top-level elementary flow categories

Level 1	Level 2
Biophysical pressures	Biological contamination
-	Direct physical changes to environment
-	Dissipative use of natural resources
-	Energy emissions
-	Overconsumption
-	Substance emissions
Economic pressures	Human time (labour & leisure hours)
-	Insufficient payment of labour or taxes
-	Monetary expenditure, except wages
Social pressures	Illegitimate resource acquisition and control
-	Inadequate work environment
-	Violence

Tab. 5: Level 2 and 3 elementary flow categories for economic and social pressures

Level 2	Level 3
Human time (labour & leisure hours)	Labour hours
-	Leisure hours
Insufficient payment of labour or taxes	Extreme underpayment of labour
-	Underpayment of labour or taxes
Monetary expenditure, except wages	Net distortionary taxes
-	Net externality-correcting taxes
-	Net non-distortionary taxes
-	Net operating surplus
-	Rent
-	Voluntary financial transfers
Illegitimate resource acquisition and control	Burglary or attempted burglary
-	Illegitimate acquisition and control of physical resources
-	Rent seeking
-	Trafficking of humans
Inadequate work environment	Bonded labour
-	Child labour
-	Excessive work
-	Inadequate ergonomic condition
-	Insufficient paid breaks for breastfeeding
-	Premature return to work after giving birth
-	Stressful work condition
Violence	Genital mutilation
-	Incarceration
-	Infringement of freedom of expression
-	Interpersonal or communal violence
-	Participation restriction
-	Reduction in well-being of animals in human care
-	Refugees warehousing
-	Threat of violence or other contact crime
-	Threatening or traumatic traffic situations

6 Modelling the impact pathways

Impact pathway modelling can take its starting point in an elementary flow, a midpoint or an endpoint, and thus model both forwards and/or backwards in the impact pathway. Modelling backwards in the direction of elementary flows ensures that the full impact can be allocated to its causes, and is thus recommendable. Causal relationships can best be expressed as marginal

characterisation factors (unit of endpoint indicator per unit of midpoint indicator or elementary flow indicator, unit of resulting midpoint indicator per unit of causing midpoint indicator or elementary flow indicator), allowing direct calculations of impacts by matrix inversion [9].

7 An example of a social impact pathway model: Undernutrition

The principle of the impact pathway modelling is illustrated in Figure 1 with a starting point in the midpoint "Undernutrition" (level 3 midpoint category under "Other human diseases") and its two further sub-categories: "Sub-optimal infant feeding practices" and "Childhood and maternal undernutrition". The extent of undernutrition is know from statistics, which allows a complete breakdown to causal factors, using on the one hand known cause-effect relationships and on the other hand a residual pathway. In the case of "Sub-optimal infant feeding practices" this residual pathway is "Insufficient health care system", and for "Childhood and maternal undernutrition" it is "Food insecurity", both having "Underpayment of labour or taxes" as the ultimate residual elementary flow.

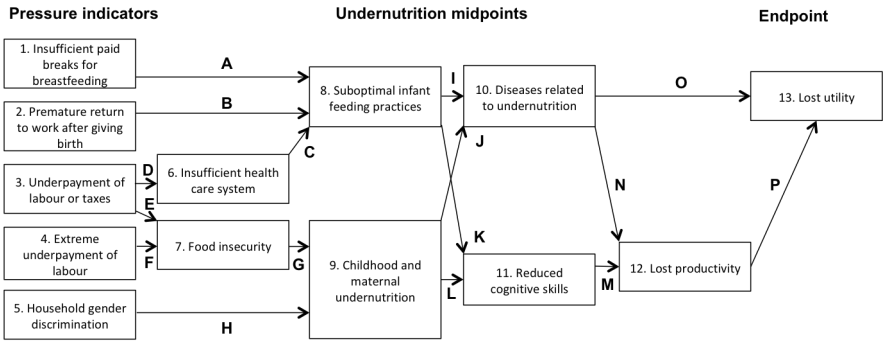

Fig. 1: Impact pathways for undernutrition in flow-chart format. Numbers and letters refer to sections in the text where each relation is described and quantified.

7.1 Pressure categories and indicators (1-5) for Undernutrition

This Section provides definitions the five pressure categories and indicators, in LCA terminology known as inventory indicators, that contribute to undernutrition.

The first four occurs in productive activities, while the last (household gender discrimination) occurs in the sphere of private households and is not related to any product life cycles (in contrast to production activities).

Pressure category (1): Insufficient paid breaks for breastfeeding

An important cause of undernutrition is *premature cessation of exclusive breastfeeding*, which is affected by insufficient breaks for breastfeeding at the workplace. Employers can guarantee paid breastfeeding breaks and thus reduce this cause of cessation of breastfeeding.

Pressure indicator: Number of annual female full-time employees without legal or contractual guarantee of a minimum of three daily paid breaks for breastfeeding providing sufficient time to express and deliver the breast milk to the child until the age of one year. Unit: (employment-)year or equivalent.

Pressure category (2): Premature return to work after giving birth

In a US cohort study of singletons whose biological mothers worked in the 12 months before delivery, Ogbuanu and co-workers [10] found that cessation of breastfeeding was not correlated to *length* of maternity leave (which does not need to be taken consecutively), but rather with first return to work. The indicator should therefore reflect requirements for early return to work, rather than the length of the maternity leave.

Pressure indicator: Number of annual female full-time employee equivalents without legal or contractual guarantee of a continuous period of maternity leave until the child has an age of six months. Unit: (employment-)year or equivalent.

Pressure category (3): Underpayment of labour or taxes

An important cause of undernutrition is poverty, inequality, and insufficient governance, leading among other things to food insecurity and insufficient health care systems (the latter partly via an intermediate midpoint impact category *Underinvestment in health care* that is not shown in Figure 1). At a very general level, all of these impacts can be related back to insufficient funding, either directly through insufficient wages or directly or indirectly through insufficient

income for managing public services. The pressure category "Underpayment of labour or taxes" is thus a very generic category that acts as a default starting point for all impact pathways that cannot (currently or by their nature) be related to more specific pressure indicators.

Pressure indicator: The difference between the current World-Bank-purchasing-power-corrected labour and tax expenditures and the labour and tax expenditures for the same amount of work hours in an ideal situation without avoidable social externalities, as defined by Weidema [6]. Unit: Purchasing-power-corrected currency units (e.g. $USD_{2017,PPP}$).

Pressure category (4): Extreme underpayment of labour

Extreme underpayment of labour is the form of underpayment that leads to extreme absolute poverty (as opposed to relative poverty) where the ability to purchase essential goods is affected. The relationship between income and malnutrition, see Figure 2 in Section 7.2, indicates that 6 USD_{2011}/day/person is the poverty line below which malnutrition begins to occur, and that a sharp increase appears at 4 USD_{2011}/day/person. Since the average amount of labour hours per day per person in 2011 is 3.87 (27 hours per week, year-round, implying that each person in full-time work provide on average for slightly less than one person out of work), the two thresholds are met for wage exceeding 1.55 and 1.03 USD_{2011}/work-hour, respectively. The underpayment is the difference between the actual payment and these poverty lines.

Pressure indicators: Accumulated differential between the World-Bank-purchasing-power-corrected labour expenditures and the poverty line of 1.55 $USD_{2011,PPP}$/work-hour, subdivided in the upper level between 1.55 and 1.03 $USD_{2011,PPP}$/work-hour and the very extreme underpayment below 1.03 $USD_{2011,PPP}$/work-hour. Unit: Purchasing-power-corrected currency units.

Pressure category (5): Household gender discrimination

Household gender discrimination is a level 4 pressure category under *Illegitimate acquisition and control of physical resources*. It can lead to *Childhood and maternal undernutrition* both in the presence of food insecurity at the household level and in households that on average are deemed to be food secure, when distribution of food within the household is skewed in favour of male household members, and indirectly through adolescent maternity and maternal depression.

Currently, the only generally available proximate indicator of household gender discrimination is that of intimate partner violence (IPV). Furthermore, IPV can in itself be seen as an actual cause for *Childhood and maternal undernutrition*, since women are more likely to have a stunted (undernourished) child if they have experienced physical intimate partner violence. This is supported by evidence of a pathway from IPV through adolescent maternity and maternal depression, both influencing nutritional status of mother and child.

Pressure indicator: Number of women with lifetime experience of physical violence. Alternative pressure indicator: Number of women with experience of physical violence within the last year. Unit: Persons.

7.2 Midpoint impact categories and indicators (6-11)

Midpoint impact category (6): Insufficient health care system

This impact category captures all avoidable causes of disease. This implies a rather broad definition of "health care system" to include also – and maybe in particular – preventive activities. It is estimated that the impact of the health care system on undernutrition is primarily related to the (insufficient) advice given to mothers. No separate outcome indicator is suggested for this advice, which implies that the same outcome indicator is used given under for the subsequent impact category (8): *Suboptimal infant feeding practices*.

Midpoint impact category (7): Food insecurity

The overall effect of underpayment via food insecurity to childhood and maternal undernutrition is modelled by the direct income poverty relationship given by Blakely and co-workers [11] and shown in Figure 2, which provides a direct relationship to the pressure indicator of *Extreme underpayment of labour*. Any food insecurity not captured by this direct relation will be captured by the indirect pathway from *Underpayment of labour or taxes,* covering insufficient income redistribution and insufficient funds for infrastructure.

Since the concern of the subsequent midpoint indicator *Childhood and maternal undernutrition* is limited to undernutrition for children and women of childbearing age, it is also this group that is particularly relevant to consider for the food insecurity indicator.

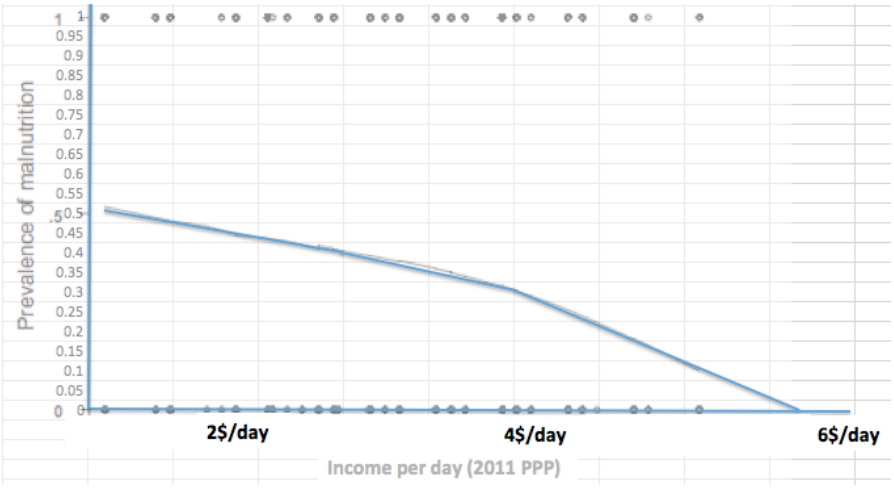

Fig. 2: Simplified relationship between income level and prevalence of malnutrition, based on data for Pakistan [11], updated to 2011 income levels.

Midpoint indicator: Prevalence of insufficient amount and quality of individual food intake among children and women of childbearing age. Unit: Dimensionless ratio representing affected fraction of population (prevalence).

Midpoint impact category (8): Suboptimal infant feeding practices (sub-category of Insufficient maternity support)

Undernutrition in infants and young children can be caused by poor feeding practices, especially insufficient breastfeeding and lack of responsive and timely complementary feeding, where the caregiver is responsive to the child clues for hunger and encourages the child to eat other foods than breast milk from the age of 6 months. To include duration of exclusive breastfeeding, the characterisation factor has been expressed in time units rather than per infant. However, this implicitly assumes that there is a linear relation between duration and impact within each assessed period (e.g., 0-6 months; 6-12 months).

Category indicators: Premature cessation of predominant breastfeeding earlier than 6 months after childbirth and *Discontinued breastfeeding earlier than 12 months after childbirth. Unit: Weeks, or equivalent time unit.*

Midpoint impact category (9): Childhood and maternal undernutrition (sub-category of Other human diseases)

This midpoint impact category covers both Protein-Energy-Undernutrition (PEU) and micronutrient deficiencies, which occur together, while micronutrient deficiencies may also occur separately. However, current data does not allow separate impact pathway descriptions for these two forms of undernutrition. Stunting (low height-for-weight) is the most appropriate measure for long-term, chronic undernutrition from the interaction of poor diet and repeated infections, often persisting even in situations of decreasing prevalence of wasting (low weight-for-height), which rather measures acute undernutrition, and underweight, which is a composite measure of both chronic and acute undernutrition.

Category indicator: Prevalence of stunting in children age 5 years and under (height for age two or more standard deviations below the median of the reference population according to the WHO Child Growth Standards). Unit: Dimensionless ratio representing affected fraction of population (prevalence).

Midpoint impact category (10): Diseases related to undernutrition

The Global Burden of Disease Collaborative Network [12] provides annual country-specific aggregate measures in Years-of-Life-Lost, Years-Lived-with-Disease (summed in Disability-Adjusted-Life-Years, DALY) for diarrheal diseases, lower respiratory infections, measles and protein-energy malnutrition related to suboptimal breastfeeding and childhood undernutrition, as well as diseases related to deficiency in Iron, Vitamin A, and zinc.

Category indicator: Incidences of specific diseases attributable to undernutrition. As human health endpoint, this may be aggregated as Disability-Adjusted person Life-Years (DALY). Unit: Number of incidences of each disease. Can be aggregated in DALY for purposes of comparison.

Midpoint impact category (11): Reduced cognitive skills

Cognitive skills are generally measured by standardised tests involving, e.g., multiple choice, sentence completion, short answer, or true-false. The outcomes are normalised to a mean of 100 and a standard deviation of 15 IQ points for the population in question. In the tradition from Lynn [13] the British mean of 100 is used as a global reference level for comparisons across populations.

Category indicator: Change in intelligence quotient. Unit: IQ points.

7.3 Endpoint impact categories (12-13) for Undernutrition

Area of Protection indicator (12): Lost human productivity

Human productivity is measured in Productivity-Adjusted person-Life-years (PALY), thus accounting for incidence and duration of the impact in person-Life-Years (LY), modified by a dimensionless impact severity factor between 0 and 1 for the relative change in production output (PA) of the affected population.

Category indicator: Relative change in production output per person-year. Unit: Productivity-Adjusted person-Life-years (PALY).

Single-score impact category and indicator (13): Lost utility

Category indicator: Utility (equity-weighted welfare). Unit: Purchasing-power-corrected and equity-weighted currency units (with indication of base year).

7.4 Characterisation factors

Referring to the letters in Figure 1, characterisation factors can be provided for the different relationships between pressure indicators, midpoint indicators, and endpoint indicators. An example of a characterisation factor (A) relating premature cessation of breastfeeding (indicator 8), measured in weeks, to workplace pressure indicator (1) can be based on the results of the global study on paid breastfeeding breaks by Heymann [14], indicating that a guarantee of such breaks would increase the average rate of breastfeeding by 10%, translated into a duration of 5 weeks per child when including continued breastfeeding until 12 months of age. Local characterisation factors per female work-year can be obtained by combining this with the local annual birth rate (children/1000 persons) and the local inverse female labour participation rate (1/(female work-years/1000 persons). By using global averages for these factors, a global default value of *0.38 weeks of additional breastfeeding/female work-year with legal or contractual guarantee of paid breaks for breastfeeding* is obtained.

8 References

[1] EEA, Environmental indicators: Typology and overview, Technical report No 25, Copenhagen, European Environmental Agency, 1999.

[2] Jolliet O, Brent A, Goedkoop M, Itsubo N, Mueller-Wenk R, Peña C, Schenk R, Stewart M, Weidema BP, Final report of the LCIA Definition study, Paris, Life Cycle Impact Assessment Programme of The UNEP/SETAC Life Cycle Initiative, United Nations Environmental Programme, 2009.

[3] Bare JC, Gloria TP. Environmental impact assessment taxonomy providing comprehensive coverage of midpoints, endpoints, damages, and areas of protection, Journal of Cleaner Production Vol. 16, 2008, pp. 1021-1035.

[4] Simões MGFP, Social Key Performance Indicators – Assessment in Supply Chains, Master Thesis, Instituto Superior Técnico, Lisboa, 2014.

[5] UNECE, Conference of European Statisticians recommendations on measuring sustainable development, United Nations, New York and Geneva, 2014, www.unece.org/publications/ces_sust_development .html

[6] Weidema BP, The social footprint – A practical approach to comprehensive and consistent social LCA, The International Journal of Life Cycle Assessment Vol. 23, No. 3, 2018, pp. 700-709.

[7] WHO, Preamble to the Constitution of the World Health Organization as adopted by the International Health Conference, New York, July 1946, Official Records of the World Health Organization, No. 2, p. 100.

[8] Weidema BP, The integration of economic and social aspects in life cycle impact assessment, International Journal of Life Cycle Assessment Vol. 11, No. 1, 2006, pp. 89-96.

[9] Weidema BP, Schmidt J, Fantke P, Pauliuk S, On the boundary between economy and environment in LCA, The International Journal of Life Cycle Assessment, early on-line view 4. October 2017, Read-only link: http://rdcu.be/wswU

[10] Ogbuanu C, Glover S, Probst J, Liu J, Hussey J, The Effect of Maternity Leave Length and Time of Return to Work on Breastfeeding. Pediatrics Vol. 127, No. 6, 2011, pp.:e1414-e1427. doi:10.1542/peds.2010-0459.

[11] Blakely T, Hales S, Woodward A, Poverty : assessing the distribution of health risks by socioeconomic position at national and local levels. Geneva: World Health Organization, WHO Environmental Burden of Disease Series, No. 10, 2004.

[12] Global Burden of Disease Collaborative Network, Global Burden of Disease Study 2016 (GBD 2016). Burden by Risk 1990-2016. Seattle: Institute for Health Metrics and Evaluation, 2017.

[13] Lynn R, Meisenberg G, National IQs calculated and validated for 108 nations, Intelligence Vol. 38, No. 4, 2010, pp. 353-360.

[14] Heymann J, Raub A, Earle A, Breastfeeding policy: a globally comparative analysis, Bulletin of the World Health Organization Vol. 91, 2013, pp. 398-406.