

# MULTIDIMENSIONAL EVALUATION OF POVERTY: INCIDENCES BETWEEN RIGHTS

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## ABSTRACT

A study on poverty based on human rights links poverty reduction to issues of rights and obligations, considering them to be interdependent, meaning that the enjoyment of certain rights can contribute to the enjoyment of others.

In this work, rights are selected for consideration in defining a multidimensional poverty index, and a matrix of direct incidences between them is constructed through expert consultation. Subsequently, it undergoes the technique of recovering forgotten effects, and intermediate incidences are found. With this information, a new consultation with experts is carried out to define an adjusted matrix of direct incidences that will allow drawing conclusions about the relative importance of rights in terms of their impact on others.

**KEYWORDS:** Poverty; Human Rights; Fuzzy Relations; Forgotten Effects

## RESUMEN

Un estudio de la pobreza basado en los derechos humanos vincula la reducción de la pobreza con cuestiones de derechos y obligaciones y considera que los mismos tienen interdependencia, es decir que el goce de ciertos derechos puede contribuir a que se disfrute de otros.

En este trabajo se seleccionan los derechos a considerar para definir un indicador de pobreza multidimensional y se construye una matriz de incidencias directas entre ellos a través de la consulta a expertos. Luego, se la somete a la técnica de recuperación de efectos olvidados y se hallan las incidencias intermedias. Con esta información, se realiza una nueva consulta a los expertos para definir una matriz de incidencias directas ajustada, que permitirá sacar conclusiones acerca de la importancia relativa de los derechos en cuanto a su incidencia sobre los demás.



**PALABRAS CLAVE:** Pobreza; Derechos Humanos; Relaciones Borrosas; Efectos Olvidados.

## INTRODUCTION

Among the top priorities currently being addressed within the framework of programmatic advancements to face the challenges of progress is the "fight against poverty". The goal is to push States to commit to political actions based on the universal values of freedom, justice, well-being, and environmental sustainability, aiming to make sustainable development of human life and the planet possible.

Numerous initiatives adopt an approach based on human rights and social development goals, thus expanding perspectives beyond purely economic welfare objectives (Salvia, 2020).

The eradication of poverty constitutes an essential Government obligation to ensure human dignity and sustainable social development. Poverty entails enduring unjust and unacceptable deprivations that hinder the full development of human capabilities and social integration (Salvia, 2020).

These deprivations violate international norms adopted as requirements for social justice and environmental sustainability (Office of the United Nations High Commissioner for Human Rights (OHCHR), 2002, 2004, 2012; Inter-American Commission on Human Rights (IACHR), 2011, 2017).

When approaching the study and measurement of poverty as a lack of fulfillment of basic rights, its concept becomes multidimensional. Since rights are interdependent and the fulfillment of each one is necessary to some extent for the enjoyment of others (OHCHR, 2002; Sandoval Terán, 2001), we consider that a multidimensional indicator must reflect this dynamic.

In this paper we produce a novel framework to study and measure the incidence of poverty from a human rights perspective based on indicators selected through consultation with experts, given the highly subjective nature of poverty as a multidimensional paradigm.

The concept of incidence is present in all human actions and constitutes an apparently simple notion that deserves detailed analysis. Incidences spread through a network of linkages in which many stages are omitted, and conclusions are lost. Even when a group of people is involved, considerations of incidences can lead to oversights, resulting in unfavorable side effects in decision-making. These forgotten effects, as Kaufmann and Gil Aluja (1989) point out, are common in such scenarios.

Using the aggregated evaluations of the selected experts, we construct a matrix of direct incidences, and we subject it to the technique of recovery of forgotten effects, with the aim to optimize its values in repeated and new iterations.

The results we present in this paper, concerning the incidence between rights, are relevant when weighting the variables of a multidimensional poverty indicator based on the human rights approach, as it enables determining the relative importance of each one. Additionally, with the accumulated incidences, we propose a prioritization of each right given its relative importance, which will help in the better design and selection of public policies to alleviate and eradicate poverty.

The results obtained in this original contribution have local scope, in this case, the City of Buenos Aires and its suburbs. Each region, province, or country may have different realities, including climatic, infrastructural, or cultural factors, which may require considering other rights or the same set of rights, but with different relative significance.

The paper is structured as follows: the following section outlines our methodology, followed by the development of the theoretical model. Section 4 presents the results and Section 5 concludes.

## DEVELOPMENT

### METHODOLOGY

#### a. Binary fuzzy relation

A crisp binary relation represents the presence or absence of association, interaction, interconnection, linkage, incidence, etc., between the elements of two sets or of the same set. This concept can be generalized to allow several degrees or intensities of association or interaction between elements through the use of fuzzy sets.

Given two sets  $X$  and  $Y$ , a fuzzy binary relation, or fuzzy relation, of  $X$  on  $Y$  (Kaufmann, 1982), is defined as any fuzzy subset of the Cartesian product  $X \times Y$ .

$$\tilde{R}: X \times Y \rightarrow [0, 1], \tilde{R} \subseteq X \times Y$$

This value can indicate incidence, preference, or another type of link between the elements of two crisp sets, whether they are identical or different.

If  $X = Y$ , then  $\tilde{R} \subseteq X^2$ , that is to say  $\tilde{R}: X \times X \rightarrow [0, 1]$ .

Binary fuzzy relations can be represented by a membership matrix  $\tilde{R} = (r_{ij})$ , where  $r_{ij} = \mu_{\tilde{R}}(x, y)$  is the degree on which  $x$  is related with  $y$ .

All operations defined with fuzzy subsets can be extended to fuzzy relations (Kaufmann and Gil Aluja, 1987).

The  $\alpha$ -cuts of a fuzzy relation are defined as follows:

$$R_{\alpha} = \{(x, y) / \mu_{\tilde{R}}(x, y) \geq \alpha\}, \alpha \in (0, 1]$$

#### b. Fuzzy relations max-min composition

Let  $\tilde{R}_1 \subset X \times Y$  and  $\tilde{R}_2 \subset Y \times Z$ . The composition of  $\tilde{R}_1$  and  $\tilde{R}_2$ ,  $\tilde{R}_1 \circ \tilde{R}_2$ , is the fuzzy whose membership function is given by:

$$\mu_{\tilde{R}_1 \circ \tilde{R}_2}(x, z) = \max_y \left[ \min \left( \mu_{\tilde{R}_1}(x, y), \mu_{\tilde{R}_2}(y, z) \right) \right] \text{ where } x \in X, y \in Y, z \in Z.$$

$$\text{If } \tilde{R} \subset X \times X: \quad \tilde{R} \circ \tilde{R} = \tilde{R}^2$$

Max-min composition is associative and non-commutative.

### c. Incidence matrixes and recovery of forgotten effects

The incidence analysis arises from the issues set by cause-and-effect relationships. This concept is related to the idea of the effects of elements from one set on the elements of another set, or the elements of a set on themselves.

The incidence relationship, thus considered, can be expressed through a matrix. To encompass all possible degrees of incidence, fuzzy relations are considered, introducing gradated valuation between zero (null incidence) and one (full incidence), including all values in the interval  $[0,1]$  according to the scale in use. When only an incidence matrix is used, the analysis corresponds to a first-order incidence (Gento et al., 2001).

The incidence of the elements of one set A on those of another set B, and the incidence of the elements of set B on those of a third set C, will give rise to two fuzzy relations. By performing the max-min composition of both relations, it is possible to obtain second-order incidences, i.e., those that constitute the incidences of elements from A on those of C through B. Thus, a second-order incidence matrix is obtained. Further consideration of other sets could lead to incidences of orders higher than two (Gento et al., 2001).

Forgotten effects are those cause-and-effect mechanisms that cannot be discerned through intuition or experience. They typically have not been foreseen or considered when decisions were made, but often manifest later, frequently disguised and at the least opportune moment.

If  $\tilde{R}$  is a square, reflexive, and non-symmetric matrix, to find second-generation effects,  $\tilde{R}^2$  is calculated, representing the union of first and second-generation effects. To isolate second-generation effects,  $\tilde{R}^2 - \tilde{R}$  is obtained as the algebraic difference. A value equal to zero in this latter matrix indicates that no accumulated effect exists, while a value close to one indicates the presence of a forgotten effect.

There is software available for "recovering" forgotten effects, allowing for the retrieval of intermediate incidences through which forgotten effects may be detected, or in other words, discovering the intermediary causes in the effects not considered. This valuable information can be used to modify or reaffirm the valuations established in the initially posed direct incidence matrix.

Investigating forgotten (or not considered) effects is useful in all decision-making contexts, particularly in the fields of Management and Economics.

## THEORETICAL FRAMEWORK

### a. Study of Poverty from a Human Rights Perspective

A human rights-based approach to poverty is grounded in the United Nations Charter (1945) and the Universal Declaration of Human Rights (1948). It links the reduction in poverty to issues of rights and obligations, not just to social assistance or charity. It encourages identifying the most vulnerable people and designing strategies to assist them (OHCHR, 2004).

The human rights included should correspond to the capabilities considered basic by a given society. Poverty reduction and human rights are two approaches of the same endeavor that reinforce each other. Considering human rights will help ensure that the essential interests of the poor are the focus of poverty reduction strategies (OHCHR, 2004).

The standards of living of the poor include precarious and inadequate livelihoods, hunger, lack of sanitation and housing, hazardous environments, unaffordable healthcare, and inaccessible education, among others. The Committee on Economic, Social and Cultural Rights notes that the right to work, an adequate standard of living, housing, food, health, and education are directly and immediately related to the eradication of poverty (OHCHR, 2004).

Poverty is not just an economic issue; it is a multidimensional phenomenon that encompasses both the lack of income and basic capabilities to live with dignity (OHCHR, 2012; Wagle, 2002).

Income-based poverty measurement assumes that earnings allow access to the goods and services required for an acceptable level of economic welfare. Although the multidimensionality of poverty is recognized, the common practice remains setting eradication goals based on monetary thresholds due to difficulties in finding a representative measure and available information.

Sen (1993) suggests identifying a set of essential competences for the individual, related to what is known as "basic capabilities". This approach would reveal the existence of elementary deprivations. Establishing minimum acceptable levels in the achievement of these basic capabilities may be an appropriate way to address poverty measurement, revealing the elementary deprivations experienced by individuals.

These ideas show the need for a definition of poverty that not only considers the lack of fulfillment of human rights, but also recognizes the limitation of economic resources. Sen's capabilities approach provides a concept of poverty that meets both requirements, inspiring a significant expansion of the concept by replacing the exclusive focus on low incomes with a multidimensional definition of poverty.

Sen's approach suggests a natural transition from capabilities to rights, as many human rights are related to fundamental freedoms such as food, health, and education. Therefore, considering poverty from the perspective of capabilities should bridge the gap from poverty to human rights (OHCHR, 2004). The capability approach is relevant for understanding poverty,

as the defining characteristic of a poor person is having limited opportunities to achieve welfare (OHCHR, 2004).

We consider that fuzzy sets theory is a useful tool for analyzing and assessing poverty through a definition that includes both welfare and economic, social, and environmental rights, in line with the sustainable human development proposed by the UN's 2030 Agenda (2015).

According to Cuellar (2008), it is only recently that the study of poverty has been related to the perspective of human rights, he considers that it is paradoxical that even governments with a social view of democracy have reservations about accepting the rights-based approach among precarious individuals and communities in poverty.

While both capabilities and rights approaches are compatible, the choice of the human rights approach is based on its more concrete measurability. The availability of data under this perspective eases the task of designing indicators.

Pinto (2008) assumes that this approach aims to consider what statistics do not capture, what is left out of calculations, and what causes them to fail. Exclusion is a globalized problem that affects the dignity of millions of people, reducing their opportunities for development and diminishing their freedom. The author asserts that this is why poverty is a human rights issue, as it is the denial of human rights.

"Economic growth does not automatically translate into an improvement in life quality for excluded and marginalized individuals and groups, unless appropriate measures or public policies are adopted to generate conditions of real equality (Economic Commission for Latin America and the Caribbean (ECLAC), 2016).

The report by the Inter-American Commission on Human Rights (IACHR) on September 7, 2017, states that poverty constitutes a human rights issue, resulting in obstacles to the enjoyment and exercise of rights on equal terms by individuals, groups, and communities living in such conditions. Furthermore, it adds that 'the analysis of poverty based on a human rights perspective entails starting from the recognition of individuals, groups, and communities living in such conditions as holders of human rights and agents of change. That is, individuals living in poverty cease to be considered as 'passive recipients of aid' or 'subjects of charity,' and instead are treated as rights holders who can actively participate in decision-making on matters that concern them and demand protection and accountability from state authorities' (IACHR, 2017).

Pinto (2008) recognizes that to overcome poverty, it is necessary to guarantee human rights more effectively, combat corruption, promote transparency in decision-making, hold officials accountable, and incentivize democracy and its decision-making mechanisms.

## RESULTS

### a. Incidences Network between Rights

To study and measure poverty in the dimension of economic, social, and environmental rights that allow for sustainable human development, as proposed by the 2030 Agenda (UN, 2015), it is necessary to determine the set of human rights to consider in defining a poverty indicator.

The Protocol of San Salvador (PSA), established by the Organization of American States (OAS) in 2016, states that according to the Universal Declaration of Human Rights and the American Convention on Human Rights, the ideal of a free human being, free from fear and misery, can only be realized if conditions are created that allow each person to enjoy their economic, social, and cultural rights, as well as their civil and political rights.

According to Sandoval Terán (2001), economic, social, and cultural rights are human rights, originating from the inherent dignity of all individuals. Therefore, he asserts that they are:

- a) Universal (belonging to every human being)
- b) Indivisible (cannot be divided or reduced)
- c) Inalienable (cannot be taken away)
- d) Interdependent (the realization of each right is indispensable for the full enjoyment of other rights)

Based on the rights recognized in the PSA, the 2030 Agenda (UN, 2015), the International Covenant on Economic, Social, and Cultural Rights (ICESCR, 1976), and the chapter on Specific Rights of the Guiding Principles on Extreme Poverty and Human Rights (OHCHR, 2012), the following rights have been selected:

- 1) Employment: fair, equitable, and satisfactory working conditions (art. 6 and 7, PSA).
- 2) Social security: covering at least medical care and subsidies in case of work-related accidents, consequences of old age, and incapacity (art. 9, PSA).
- 3) Health access: primary health care for all individuals, immunization against infectious diseases, prevention of endemic or professional diseases, education on the prevention and treatment of health problems (art. 10, PSA).
- 4) Healthy environment: access to basic public services and sufficient infrastructure. State promotion of the protection, preservation, and improvement of the environment (art. 11, PSA).
- 5) Decent housing: the right to adequate housing recognizes the right to live in a place with security, peace, and dignity (art. 11, International Covenant on Economic, Social, and Cultural Rights (ICESCR)).



6) Adequate food: access to proper nutrition enabling the highest level of physical, emotional, and intellectual development (art. 12, PSA).

7) Education: empowering all individuals to effectively participate in a democratic and pluralistic society, achieve dignified subsistence, foster understanding, tolerance, and friendship among all nations and racial, ethnic, or religious groups (art. 13, PSA).

8) Participation in cultural life: participating in the cultural and artistic life of the community and enjoying the benefits of scientific and technological progress (art. 14, PSA).

Furthermore, the international framework of human rights considers that these rights have interdependence, meaning that the enjoyment of certain rights may depend on or contribute to the enjoyment of other rights (OHCHR, 2002). For example, if an individual has training in an industry, they may have better job opportunities, and if they have better working conditions, they may have better access to food.

Once the rights have been selected to define a multidimensional poverty indicator, the network of incidences between them was determined through consultation with experts using a quantitative survey. Each right affects the others to varying degrees; understanding these incidences will allow determining the importance of each variable involved in the indicator to be defined. For this purpose, a fuzzy matrix of incidences of the set of rights in itself is proposed, which will provide valuable information for the formulation of policies and strategies.

The experts consulted are specialists and researchers in poverty and human rights issues, social workers, officials from the Ministry of Social Development of the Province of Buenos Aires, and other public agencies related to the topic, as well as members of an NGO assisting indigenous peoples. The consultations were carried in the months of April, May, and June of the year 2023. The experts expressed their opinions autonomously and individually using a scale of 11 values in the interval  $[0,1]$  as shown in Table 1 (Kaufmann and Gil Aluja, 1989, p. 26) and using the form in the Annex.

The mode was considered as the aggregate opinion of the specialists consulted because the frequencies of the rest of the categories were not significant with respect to the one with the highest frequency, so it more adequately represents the consensus we expected to find. Additionally, it is assumed that each element affects itself with "the greatest incidence," meaning that the diagonal of the matrix is formed by ones.

The collected information was filtered, and responses showing inconsistencies or lack of attention were excluded. With these results, we constructed the matrix  $\tilde{R}$  of direct incidences (Figure 1).



**Table 1***Semantic correspondence of incidences*

Incidence Value	Semantic correspondence
0	without incidence
0.1	practically without incidence
0.2	almost no incidence
0.3	very weak incidence
0.4	weak incidence
0.5	mean incidence
0.6	sensitive incidence
0.7	quite a lot of incidence
0.8	strong incidence
0.9	very strong incidence
1	full incidence

*Note. This table shows the semantic correspondence of each numerical value of the incidences.*

**Figure 1***Direct incidences matrix*

Rights $\tilde{R}$	1. Employment	2. Social security	3. Health	4. Healthy Environment	5. Decent Housing	6. Nutrition	7. Education	8. Participation in cultural life
1. Employment	1,00	0,90	0,80	0,80	0,70	0,80	0,50	0,70
2. Social security	0,80	1,00	0,90	0,50	0,60	0,70	0,50	0,70
3. Health	0,80	0,70	1,00	0,50	0,10	0,80	0,90	0,50
4. Healthy environment	0,40	0,00	0,90	1,00	0,70	0,80	0,80	0,60
5. Decent housing	0,50	0,00	0,90	0,90	1,00	0,70	0,80	0,70
6. Nutrition	0,80	0,50	1,00	0,30	0,20	1,00	0,80	0,80
7. Education	0,90	0,70	0,80	0,80	0,50	0,80	1,00	0,80
8. Participation in cultural life	0,70	0,10	0,50	0,40	0,40	0,60	0,80	1,00

*Note. The matrix shows the direct incidences between the selected rights, expressed in numerical form.*

In Figure 2, the matrix of direct incidences expressed in linguistic form is observed, with the semantic correspondences from Table 1.

**Figure 2**

Matrix of direct incidences expressed in linguistic form

$\tilde{R}$	1	2	3	4	5	6	7	8
1	full	very strong	strong	strong	quite	strong	mean	quite
2	strong	full	very strong	mean	sensitive	quite	mean	quite
3	strong	quite	full	mean	practically without incidence	strong	very strong	mean
4	weak	without incidence	very strong	full	quite	strong	strong	sensitive
5	mean	without incidence	very strong	very strong	full	quite	strong	quite
6	strong	mean	full	very weak	almost without incidence	full	strong	strong
7	very strong	quite	strong	strong	mean	strong	full	strong
8	quite	practically without incidence	mean	weak	weak	sensitive	strong	full

*Note: The matrix displays the direct incidences among the selected rights, expressed in linguistic form.*

Based on the values in Figure 2, we can assert that one right, food, fully impacts another, access to health. Adequate nutrition and participation in daily life do not have a very strong impact on other rights. However, all the rights considered strongly impact at least one of the others.

Work and education have a very strong, strong, or quite strong impact on six rights; social security; access to health and a healthy environment on four; decent housing on five; adequate nutrition on three; and participation in cultural life on two. This information was used to weigh the rights in a multidimensional poverty indicator.

It can be observed that work and education are the rights that have the greatest impact on others, followed by decent housing.

### b. Forgotten Effects

Next, we analyze the effects overlooked when assessing the incidences of the rights considered to define a poverty indicator. To do this, we calculate  $\tilde{R}^2$  (Figure 3) and  $\tilde{R}^2 - \tilde{R}$  (Figure 4).

**Figure 3***Matrix of Cumulative Effects of 1st and 2nd Generation*

$\tilde{R}^2$	1	2	3	4	5	6	7	8
1	1	.9	.9	.8	.7	.8	.8	.8
2	.8	1	.9	.8	.7	.8	.9	.7
3	.9	.8	1	.8	.7	.8	.9	.8
4	.8	.7	.9	1	.7	.8	.9	.8
5	.8	.7	.9	.9	1	.8	.9	.8
6	.8	.8	1	.8	.7	1	.9	.8
7	.9	.9	.8	.8	.7	.8	1	.8
8	.8	.7	.8	.8	.7	.8	.8	1

Note: The matrix displays the cumulative effects of the first and second generation.

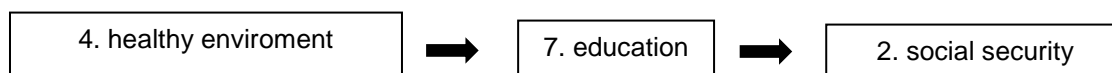
**Figure 4***Second Generation Effects Matrix*

$\tilde{R}^2 - \tilde{R}$	1	2	3	4	5	6	7	8
1	0,00	0,00	0,10	0,00	0,00	0,00	0,30	0,10
2	0,00	0,00	0,00	0,30	0,10	0,10	0,40	0,00
3	0,10	0,10	0,00	0,30	0,60	0,00	0,00	0,30
4	0,40	0,70	0,00	0,00	0,00	0,00	0,10	0,20
5	0,30	0,70	0,00	0,00	0,00	0,10	0,10	0,10
6	0,00	0,30	0,00	0,50	0,50	0,00	0,10	0,00
7	0,00	0,20	0,00	0,00	0,20	0,00	0,00	0,00
8	0,10	0,60	0,30	0,40	0,30	0,20	0,00	0,00

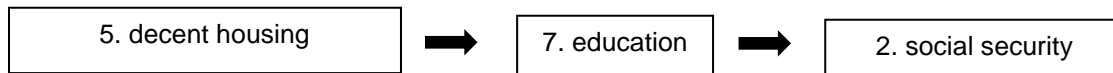
Note: The matrix displays second generation effects, highlighting values greater than 0.5 for further study.

In Figure 4, the 6 highest values of  $\tilde{R}^2 - \tilde{R}$  have been marked, and for these, intermediate incidences have been obtained.

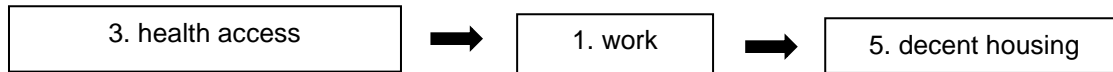
i) If a healthy environment impacts education with a value of 0.8, and education impacts social security with a value of 0.7, the incidence of the environment on social security should be higher than the one proposed as a direct incidence in  $\tilde{R}$  (0).



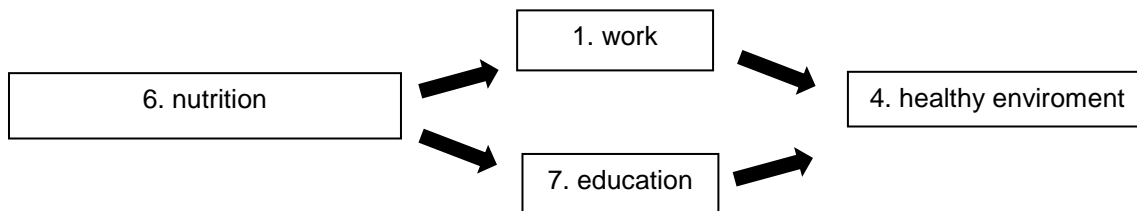
ii) If decent housing impacts education with a value of 0.7, and education impacts social security with a value of 0.7, the incidence of housing on social security should be higher than the one proposed in  $\tilde{R}$  (0).



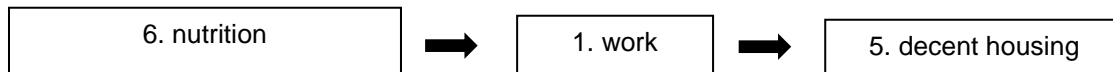
iii) If health access affects work with a value of 0.8, and work impacts housing with a value of 0.7, the incidence of access to health on housing should be higher than the one proposed in  $\tilde{R}$  (0.1).



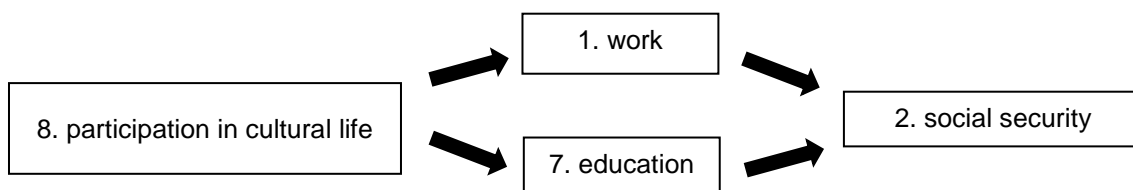
iv) If adequate nutrition impacts work and education with a value of 0.8 each, and work and education impact the environment with a value of 0.8, the incidence of nutrition on the environment should be higher than the one proposed in  $\tilde{R}$  (0.3).



v) If nutrition impacts work with a value of 0.8, and work impacts decent housing with 0.8, the incidence of nutrition on decent housing should be higher than the one proposed in  $\tilde{R}$  (0.2).



vi) We can observe that participation in cultural life has an incidence on work of 0.7 and on education of 0.8, and both impact social security with values of 0.9 and 0.7, respectively. This indicates that participation in cultural life has a greater impact on social security than the one proposed in  $\tilde{R}$  (0.1).



In all analyzed cases, the intermediate incidences are work and/or education, particularly in cases iii) and vi) both are intermediate incidences.

### c. Modified Direct Incidences Matrix

The results discussed in the previous section were sent to the experts in July 2023, and their responses were considered to confirm or rectify the  $\tilde{R}$  matrix. With the new results

they provided, the matrix of direct incidences was adjusted, thus obtaining the  $\tilde{R}^*$  matrix (Figures 5 and 6).

**Figure 5**

*Modified Direct Incidences Matrix*

$\tilde{R}^*$	1	2	3	4	5	6	7	8
1	1,00	0,90	0,80	0,80	0,70	0,80	0,50	0,70
2	0,80	1,00	0,90	0,50	0,60	0,70	0,50	0,70
3	0,80	0,70	1,00	0,50	0,50	0,80	0,90	0,50
4	0,40	0,50	0,90	1,00	0,70	0,80	0,80	0,60
5	0,50	0,50	0,90	0,90	1,00	0,70	0,80	0,70
6	0,80	0,50	1,00	0,40	0,50	1,00	0,80	0,80
7	0,90	0,70	0,80	0,80	0,50	0,80	1,00	0,80
8	0,70	0,30	0,50	0,40	0,40	0,60	0,80	1,00

*Note: The matrix displays the new modified direct incidences after studying the overlooked effects, expressed in numerical form.*

**Figure 6**

*Modified Direct Incidences Matrix, expressed in a linguistic form*

$\tilde{R}^*$	1	2	3	4	5	6	7	8
1	full	very strong	strong	strong	quite	strong	mean	quite
2	strong	full	very strong	mean	sensitive	quite	mean	quite
3	strong	quite	full	mean	mean	strong	very strong	mean
4	weak	mean	very strong	full	quite	strong	strong	sensitive
5	mean	mean	very strong	very strong	full	quite	strong	quite
6	strong	mean	full	weak	mean	full	strong	strong
7	very strong	quite	strong	strong	mean	strong	full	strong
8	quite	very weak	mean	weak	weak	sensitive	strong	full

*Note: The matrix displays the new modified direct incidences after studying the overlooked effects, expressed in linguistic form.*

Comparing the values of the direct incidence matrix  $\tilde{R}$  (Figure 2) with those of the modified matrix  $\tilde{R}^*$  (Figure 6) according to the new responses from the experts, we observe that there are no variations in the number of full, very strong, strong, or significant incidences (greater than or equal to 0.7), with full incidence remaining only in the case of adequate nutrition on health access. Four of the values for which the intermediate incidences of the

overlooked effects were analyzed were elevated to medium incidence (from 0, 0.1, or 0.2 to 0.5); while one moved from very weak incidence to weak (from 0.3 to 0.4) and another rose from practically no incidence to very weak incidence (from 0.1 to 0.3).

If we add the incidence values of each right over the others in the  $\tilde{R}^*$  matrix, without considering the incidence on themselves, we obtain the accumulated incidences, shown in Table 2.

**Table 2**

*Accumulated incidences*

Right	Accumulated incidences
1. work	5.2
2. social security	4.7
3. health access	4.7
4. healthy environment	4.7
5. decent housing	5
6. nutrition	4.8
7. education	5.3
8. participation in cultural life	3.7

*Note: The table shows the accumulated incidences of each right.*

The results shown on Table 2 allow for the ranking of the rights according to the accumulated incidences: 1st) education, 2nd) work, 3rd) decent housing, 4th) nutrition, 5th) social security, access to health, and a healthy environment, and lastly 6th) participation in cultural life.

It is highlighted throughout this paper that work and education are the rights that have the greatest incidence on the others.

## CONCLUSIONS

The importance of the study of the incidence matrix  $\tilde{R}$ , developed and analyzed in this work, is linked to the interdependence of rights, i.e. the satisfaction of some rights may depend on others or contribute to the enjoyment of others. Our results contribute to defining a poverty indicator based on the human rights approach. Knowing whether and to what degree rights are related provides valuable information when designing a global poverty indicator. Our results can be considered, for example, when establishing weights for each of the rights in a general indicator.

It is very helpful for decision making to find the intermediate incidences through which the forgotten effects have been detected. That is, discovering the causes that act as

intermediaries in the overlooked effects, since they provide information that can be used to modify or confirm the valuations established in the direct incidence matrix.

In the cases we have analyzed, the intermediate incidences that arise are work and education, rights that connect dimensions that seemed unrelated in the  $\tilde{R}$  matrix. For example, in case i), a healthy environment impacts social security since good environmental conditions reduce the risk of contracting diseases and workplace accidents.

According to our results, we can conclude that education and work are the rights that have the greatest influence on the others; both must be promoted and protected to ensure a dignified and full life. They are followed by decent housing and adequate nutrition, which require the adoption of specific measures to ensure their fulfillment for all people.

These results can be used to make more efficient political decisions that help mitigate poverty, such as facilitating conditions for the creation of genuine jobs and training heads of households to achieve better working conditions.

## REFERENCES

- Barcellos-Paula, L., De la Vega, I., y Gil-Lafuente, A.M. (2021). The Quintuple Helix of Innovation Model and the SDGs: Latin-American Countries' Case and Its Forgotten Effects. *Mathematics*, 9(4), 416-439. <https://doi.org/10.3390/math9040416>.
- Comisión Interamericana de Derechos Humanos (2011). *Informe Anual de la Comisión Interamericana de Derechos Humanos*. OEA.
- Comisión Interamericana de Derechos Humanos (2017). *Informe sobre pobreza y derechos humanos en las Américas*, OEA/Ser.L/V/II.164 Doc. 147. OEA.
- Comisión Económica para América Latina y el Caribe (CEPAL) (2016). *Desarrollo Social Inclusivo: Una nueva generación de Políticas para superar la Pobreza y Reducir la Desigualdad en América Latina y el Caribe*. Comisión Económica para América Latina y el Caribe (CEPAL).
- Comisión Económica para América Latina y el Caribe (CEPAL) (2023). *Glosario. Portal de desigualdades en América Latina. División de Estadísticas. Comisión Económica para América Latina y el Caribe (CEPAL)STAT*. Recuperado de <https://statistics.cepal.org/portal/inequalities/glossary.html?lang=es>.
- Cuellar, R. (2008). Presentación. *Revista IIDH*, 48, 7-8.
- García, P., Lazzari, L., y Machado, E. (1998). Una propuesta fuzzy para definir indicadores de pobreza, en *Proceedings of SIGEF'98 Congress, Uncertainty Logics: Applications in Economics and Management*, SIGEF.



- Gento, A., Lazzari, L. y Machado, E. (2001). Reflexiones acerca de las matrices de incidencia y la recuperación de efectos olvidados. *Cuadernos de CIMBAGE*, 4, 11-27.
- Kaufmann, A. (1982). *Introducción a la teoría de los subconjuntos borrosos. Elementos teóricos de base*. CECSA.
- Kaufmann, A. y Gil Aluja, J. (1986). *Introducción a la teoría de subconjuntos borrosos a la gestión de las empresas*. Editorial Milladoiro.
- Kaufmann, A. y Gil Aluja, J. (1987). *Técnicas operativas de gestión para el tratamiento de la incertidumbre*. Hispano Europea.
- Kaufmann, A. y Gil Aluja, J. (1989). *Modelos para la investigación de efectos olvidados*, Editoria Milladoiro.
- Lazzari, L. (2021). Aportes de la teoría de conjuntos borrosos al estudio y medición de la pobreza desde un enfoque de los derechos humanos. Discurso de ingreso a la Real Academia de Ciencias Económicas y Financieras de España.
- \*Lazzari, L. y Fernandez, M.J. (2008). Linguistic model of affinity grouping to the study of poverty. *Fuzzy Economic Review*, 13 (2), 37-52.
- Lazzari, L. y Moulia, P. (2008). Relaciones binarias: Un enfoque alternativo. *Actas XIII Jornadas de Epistemología de las Ciencias Económicas*. Facultad de Ciencias Económicas, Universidad de Buenos Aires.
- Oficina del Alto Comisionado de las Naciones Unidas para los Derechos Humanos (OACDH) (2002). *Draft Guidelines: A Human Rights Approach to Poverty Reduction Strategies*, Oficina de la Alta Comisionada de las Naciones Unidas para los Derechos Humanos. Recuperado de <http://www.unhchr.ch/development/povertyfinal.html>.
- Oficina del Alto Comisionado de las Naciones Unidas para los Derechos Humanos (OACDH) (2004). *Los derechos humanos y la reducción de la pobreza. Un marco conceptual*. Oficina del Alto Comisionado para los Derechos Humanos.
- Oficina del Alto Comisionado de las Naciones Unidas para los Derechos Humanos (OACDH) (2012). *Los Principios Rectores sobre la Extrema Pobreza y los Derechos Humanos*. Oficina del Alto Comisionado para los Derechos Humanos.
- Organización de las Naciones Unidas (ONU) (2015). *Transformar nuestro mundo: la Agenda 2030 para el Desarrollo Sostenible*. Organización de las Naciones Unidas (ONU).
- Oficina Regional de Educación para América Latina y el Caribe / Oficina Regional de Educación para América Latina y el Caribe OREALC/UNESCO Santiago (2007). El

- derecho a una educación de calidad para todos en América Latina y el Caribe. *REICE - Revista Electrónica Iberoamericana sobre Calidad, Eficacia y Cambio en Educación*, 5(3), 1-21. Recuperado a partir de <https://revistas.uam.es/reice/article/view/10139>.  
<https://doi.org/10.15366/reice2007.5.3>
- Pinto, M. (2008). Los derechos humanos desde la dimensión de la pobreza. *Revista IIDH*, 48, 43-62.
- Naciones Unidas. Derechos Humanos, Oficina del Alto Comisionado (1976). Pacto Internacional de Derechos Económicos, Sociales y Culturales (PIDESC). Edición especial de los estudios sobre pobreza y derechos humanos. Recuperado de [https://www.ohchr.org/sites/default/files/cescr\\_SP.pdf](https://www.ohchr.org/sites/default/files/cescr_SP.pdf)
- Programa de las Naciones Unidas para el Desarrollo (PNUD) (2016). Apoyo del Programa de las Naciones Unidas para el Desarrollo (PNUD) a la implementación del Objetivo de Desarrollo Sostenible 1. Recuperado de <http://cort.as/-HJq>.
- PSA. (2016). Protocolo de San Salvador. Más derechos para más gente. Serie sobre Tratados N°69, OEA. Recuperado de <https://www.oas.org/es/sadye/inclusion-social/protocolo-ssv/docs/protocolo-san-salvador-es.pdf>
- Salvia, A. (Ed.) (2020). *La pobreza como privación más allá de los ingresos. Introducción de datos fundados en un enfoque de Derechos - 1a ed.* Educa.
- Sandoval Terán, A. (2001). *Los derechos económicos, sociales y culturales. Una revisión del contenido esencial de cada derecho y de las obligaciones del Estado*. DECA Equipo Pueblo A.C.
- Sen, A. (1993). *Choice, welfare and Measurement*. Oxford, Basil Blackwell.
- Wagle, Udaya. (2002). Rethinking poverty: Definition and measurement. *International Social Science Journal*, 54, 155-165. <https://doi.org/10.1111/1468-2451.00366>.

## BIBLIOGRAPHICAL ABSTRACT

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