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# The Social Services Risk Index at Local Level: A Tool for Diagnosis and Decision Making

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**Abstract:** The COVID-19 pandemic has had a decisive impact on our society, generating both direct and indirect effects in a multitude of dimensions, beyond the purely health-related, which have conditioned people's well-being and quality of life. The social services system has played an essential role in absorbing the consequences of these impacts on the most socially vulnerable population. Analysing the social impacts and monitoring the risks derived from the pandemic can favour the prevention of risk situations, adjust the resources of the social services system to changing social realities and facilitate the strategic decision-making process to mitigate or minimise the impacts of potential socio-annual crises or catastrophes. This article presents a methodological process, based on the HCVRA (Hazards, Capacity Building, Vulnerability, Risk Assessment) disaster management models, designed ad hoc with the aim of identifying, on the one hand, the social impacts of COVID-19 and, on the other hand, the areas with the highest social risk in the post-COVID scenario. The application of this methodological process has made it possible to configure a set of indicators based on public databases, defined by consulting experts and weighted by a panel of stakeholders through a multi-criteria method to obtain a territorialised risk index at the highest level of disaggregation of the available data, based on the dimensions of vulnerability, threat and resilience.

**Keywords:** risk assessment; HCVRA; social services; indicators; stakeholders; COVID-19



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## 1. Introduction

The impact and scope of the effects generated by the COVID-19 pandemic have been devastating and its consequences have been evident in each sector of our societies (economic, political, social, health, cultural, etc.) and have had a determining impact on people's lives.

The health crisis has generated a social crisis, the effects of which will last much longer. In this context, social cohesion is at risk, and social services have a key role to play in this. Although certain impacts and scopes of this crisis are known, it is necessary to reflect on the evidence that has already been revealed, with the aim of generating appropriate responses to the scenario in which social services will operate in the immediate future (Santás García 2020). Thus, the social services system appears to be a key element in the face of a new crisis, the true scale of which is still difficult to quantify.

For the first time in a long time, we can say that we have faced a global pandemic, which has not been confined to developing countries as is usual in health crises of this kind but has affected every country in the world. However, despite its global reach, it should be made clear that the virulence of its effects has been even greater in those contexts characterised by greater vulnerability and less developed social and health systems, which have been key drivers of responses to this pandemic, together with socio-labour and economic measures. As Amadasun (2020) states, most of the literature produced by social

work during the early stages of the COVID-19 crisis emphasizes the unequal health and social impact of the crisis on certain groups that were already vulnerable before the crisis. This can be seen not only between countries at different levels of development but also in important internal differences within the same country, region or even city, depending on the resources and characteristics of each territorial context. Knots of inequalities have been generated, which, as Pérez-Sainz (2021) points out, has meant that the pandemic has deepened urban territorial fragmentation and added new aspects of inequality, accentuating the invisibility of the world of social marginalisation for the rest of society.

Considering that not all territories have the same resources and potential to cope adequately with crises of different origins and scope to limit their intensity and return to normality as soon as possible, it is necessary to have an in-depth knowledge of the characteristics and complexity of the territories, as well as the tools they must successfully face the possible structural changes that may arise.

This global crisis has highlighted the lack of theoretical models that could facilitate the prevention and management of the effects of a pandemic of the scale of SARS-CoV-2. While it is true that this kind of pandemic is certainly difficult to predict, it is also true that the existence of scientific models that facilitate management and decision-making in contexts of high uncertainty, such as the one we have recently experienced, would greatly facilitate the processes, serving as a roadmap and helping to considerably mitigate the impacts derived from crises of this nature.

A lack of experience in managing situations of this magnitude has led in many cases to improvised decisions. Considering this situation and the learning that it has entailed as a society to live through such a situation, the objective of this project is to propose a model that facilitates the management of uncertainty in contexts of potential disasters. Given the prominence that the social services system has acquired in addressing the effects generated by the pandemic, this paper presents a methodological process, based on disaster management models, designed ad hoc, with the aim of identifying the socioeconomic impacts of COVID-19 and the capacity of the social services system to cope with the new situation, as well as the identification of new opportunities arising from this crisis.

The control of the spread of the disease in Spain required the declaration of a State of Alarm in March 2020, which entailed, in addition to the confinement of the population to their homes, the practical shutdown of all activities, except those considered essential. Initially, social services were not considered essential, which led to the cancellation of projects and services that addressed the needs of large sections of the population in vulnerable situations. However, the authorities were quickly aware of the strong impact that the limitation of these services would have, especially in a situation such as the one we were living in, in which the living conditions of a large part of society were worsening day by day, increasing the already existing population in a situation of vulnerability. All this led to the Spanish government activating Order SND/295/2020 12 days later, making social services essential services, albeit conditioned by the State of Alarm.

In situations of this importance, which lead to a situation of risk for a community, whether due to a social or health emergency or the existence of a catastrophe that, due to its dimension, overwhelms public services, the involvement of specialised professionals becomes necessary. The existence of new conflictive situations requires new responses from social services in order to offer comprehensive assistance.

The contributions and effectiveness of the actions implemented by the social services are evidence of their important work in the face of the challenge of detecting the needs of the times, resolving multiple realities, and adapting their intervention to the problems of the moment, including in an emergency or disaster environment. It is a broad approach, which not only focuses on intervening in existing problem situations but also has great potential to act in the face of new circumstances of greater magnitude and social impact, such as a global pandemic.

In this way, the social services system is a key element in dealing with the effects of this new crisis, the magnitude, and effects of which we are not yet able to quantify. In this

sense, social protection systems, specifically social services, are crucial in reversing and mitigating the negative effects derived from situations of vulnerability and threat, exerting a buffer effect in the face of such situations.

In addition to the role of social services as a pillar of resilience in reducing the negative consequences and mitigating the effects of shocks, another key element when analysing the impact that different adverse events or circumstances may have on societies is the level of pre-existing vulnerability. Thus, one highly vulnerable group may be severely affected by a minor disaster, while another less vulnerable group may emerge unscathed from a more serious disaster. Thus, disasters rarely result in a disaster where the population is not very vulnerable, while disaster occurs where there is a significant number of vulnerable households that are severely affected by the disaster.

Considering the diversity in terms of the characteristics of the territories, and the fact that they do not all have the same resources and potential to deal adequately with different types of crises, it is necessary to have an in-depth knowledge of the characteristics and complexity of the territories in order to understand their weaknesses and the tools they have to face different circumstances with greater or lesser success. An adequate analysis of vulnerability in a specific context is essential to be able to adequately design and orientate public policies in social and economic matters, as well as the interventions that can be carried out by social services (De Armiño 1999).

In view, on the one hand, of the importance and prominence of social services as a pillar (shield of protection) and, on the other, of the need for in-depth knowledge of the basic characteristics of the territories (vulnerability and hazards) as elements that could have a significant influence on the impact that different circumstances could be exerting, this paper proposes the adaptation of Impact Assessment and risk and disaster management methodologies applied to the social services system.

In the field of disaster risk assessment and management, there is a broad scientific consensus on the proposal of methodological models that include vulnerability, hazards and resilience, understood as the capacity to reduce vulnerability, control risks and manage uncertainty in potential disaster scenarios (from the Hazard, Vulnerability, Capacity and Risk Assessment model, hereafter HVCRA). In this way, we found HVCRA methods in flood risk management (Kamanga et al. 2020; Koks et al. 2015; Rezende et al. 2020), droughts (Ebi and Bowen 2016; Meza et al. 2020), risks in areas sensitive to storms or hurricanes (Lagomarsino and Giovinazzi 2006; Reinoso et al. 2020; Taramelli et al. 2015), earthquakes (Kadam et al. 2020; Lantada et al. 2009; Zuloaga et al. 2020) or consequences of climate change (van Aalst et al. 2008; Dolan and Walker 2006; Ford and Smit 2004; Nguyen et al. 2016; Preston et al. 2011).

There is also some precedent for adapting these methods to health impacts and adaptation of the public health system to specific hazards or disasters (Estoque et al. 2020; Few 2007; Hess et al. 2012; Keim 2008), applied to urban planning and urban vulnerability (Lankao and Qin 2011; Wilhelmi and Hayden 2010), to social vulnerability and poverty in developing countries (Gentle and Maraseni 2012) and to socio-economic impacts and regeneration (Ahsan and Warner 2014; Preston et al. 2011; Rezende et al. 2020; Scheuer et al. 2011).

This model addresses vulnerability, hazard and resilience factors in risk anticipation. It is an approach that is fully applicable to the social field, and specifically to social services in the aftermath of the COVID-19 pandemic situation. This pandemic has highlighted the need to know to be able to act with foresight in crisis situations that may occur, with the need to be able to start from a model that provides knowledge and facilitates decision-making, even if it contemplates the flexibility of random or unlikely causes.

This paper presents the methodological elements of the construction process of the social services risk index (IRISS), as well as a central section of results with all the phases of this process, from the identification of indicators of the proposed dimensions, the evaluation by experts, as well as the participatory obtaining of the weighting weights with a multi-criteria evaluation with stakeholders. Finally, the construction of the database and the

explanation of the calculation of the index. This is followed by elements of discussion along the lines set out in the theoretical introduction and conclusions that are considered relevant in this respect.

## 2. Materials and Methods

To this end, it is necessary to make a methodological effort to include the potential risks and threats in existing impact prevention and prediction models, due to the high levels of uncertainty generated by the pandemic or any other crisis situation that may arise. This paper proposes, as an innovative element, to make a methodological effort to adapt these models to the social services system. The aim is to apply the HVCRA method to the social services system to assess the impact and management of the socio-economic and territorial risks associated with COVID-19. On the one hand, to analyse the impact of COVID-19 on the Andalusian social services system itself and, on the other hand, to calculate its Risk Index in the post-COVID stage, providing a complex multidimensional model for future crisis scenarios, as well as territorialised knowledge for management and decision-making. As part of the integrated cycle, this methodology helps to identify, prevent and mitigate risks, enabling the transfer to be clear, and intelligible and assist in strategic decision-making processes.

Due to the scope and complexity of the system, the methodology will be applied through two pilots. A pilot will be carried out in all Community social services in Andalusia, belonging to the Regional Ministry of Equality, Social Policies and Work-Life Balance. The second pilot will be carried out in the social services for the Elderly in Andalusia, which are the services that have been subjected to the greatest stress due to the severity of the incidence of the disease in the elderly, and with one of the groups that have suffered the most from the pandemic (Martínez and Girón 2020).

Although the application of impact assessment in the field of social services has a long scientific history, the application and adaptation of the HVCRA method of risk management represent an important advance and innovation, making it possible to analyse these services through the criteria that are of extreme importance in the new social reality after the pandemic.

The transference of the HVCRA method to the field of social services in this project has followed a sequence of phases that have led to the final social services Risk Index (SSRI) (1), which considers the ratio of vulnerability to hazards to resilience in its calculation. This index has been calculated for the year 2019 as a pre-COVID index and with data available for the year 2021 as a post-COVID index. Thus, the impact is the ratio between both time points.

$$\mathrm{SSRI} = \frac{\mathrm{iV\ iH}}{\mathrm{iR}} \quad (1)$$

Composite indices are widely used to measure multidimensional concepts that are not directly quantifiable and synthesize a large amount of diverse information, with individual weighted indicators.

The fundamental phases of the project are described below and are described in detail in Figure 1, which shows the complete methodological process for the model, specifying the reality for general social services as well as specifically for social services for older people. Similarly, the process for the calculation of the SSRI pre-COVID and post-COVID, for the subsequent calculation of the impact. This figure serves as a guiding thread for the presentation and explanation of the processes followed, which are described in detail in the following section on results.

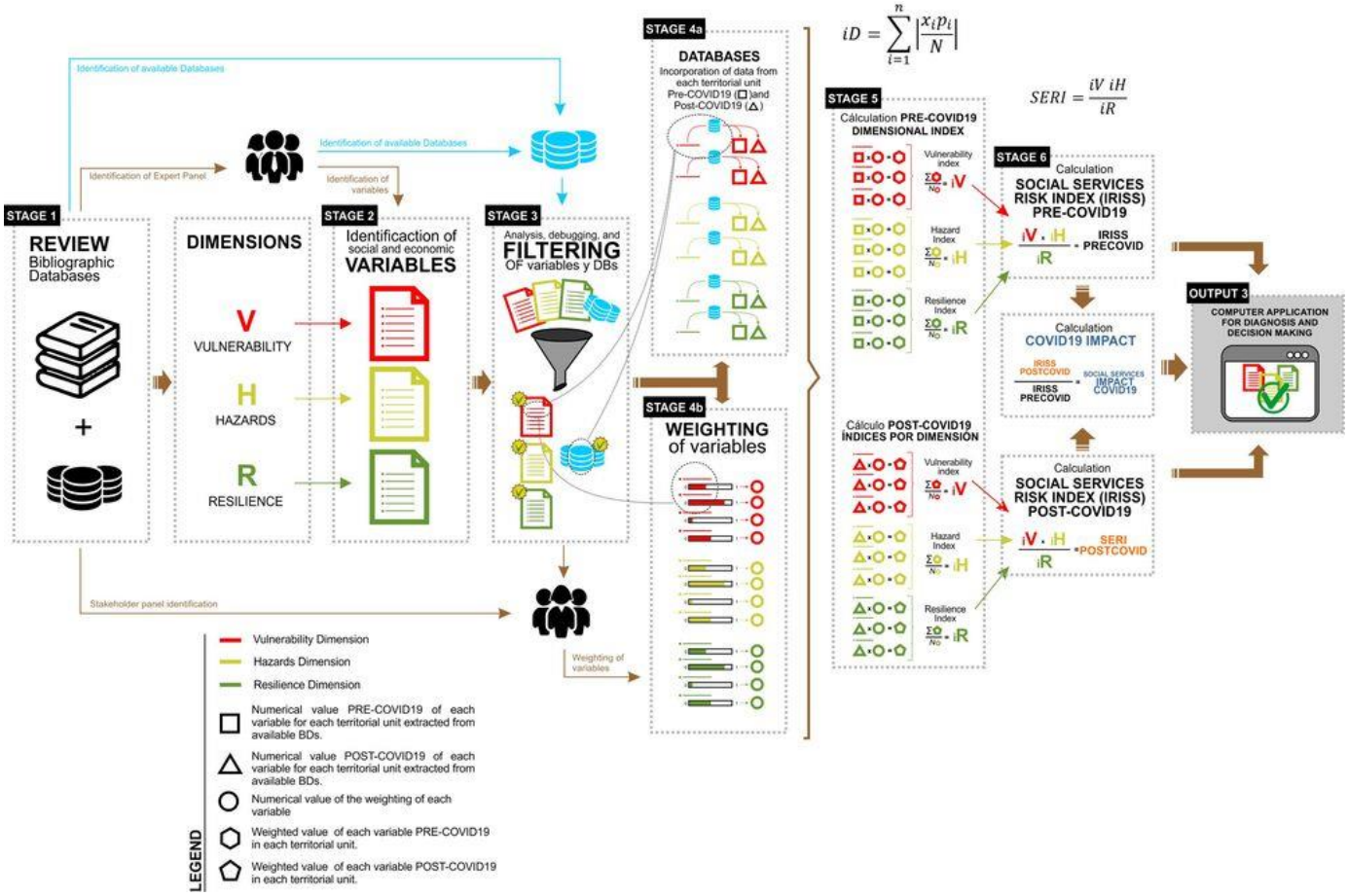


**Figure 1.** Outline of the methodological process IRISS Project. Risk and Impact Index on social services. Source: Authors.

## 3. Results

### *3.1. Phase 1: Identification and Validation of the Indicators That Make Up the Model*

Once the dimensions into which the model is structured (vulnerability, hazards and resilience) had been identified, the first step consisted of theoretically defining the content of each one of them, as well as the indicators to be included in them. In this way, the dimensions have been defined as follows:

- The vulnerability dimension has been defined as reflecting situations of fragility linked to the socio-demographic structure and data directly related to the population.
- The hazard dimension contains indicators that relate more directly to the territorial context.
- Resilience has been defined as the capacity of social protection systems, in this particular case social services, to reverse the negative effects derived from the situations of vulnerability and threats contemplated in the previous dimensions, exerting a cushioning effect in crisis situations.

In parallel to the literature review, a selection of publicly available indicators has been made at the municipal level for the years in question (2019 and 2021), based on the three dimensions that make up the model. This prior selection by the research team was followed by several processes. One of these involved expert validations using the Delphi method to assess the degree of importance and suitability of the indicators.

The Delphi methodology is one of the best-known and proven methods (Landeta 1999), it has demonstrated a high degree of effectiveness whenever it has been used (Christie and Barela 2005; Okoli and Pawlowski 2004), and it is also very useful when experts are dispersed territorially (Miller 2001). Following the theoretical postulates of this method

(Blasco et al. 2010), two groups have been formed to validate the system of indicators designed: on the one hand, the coordinating group, formed by the members of the research team and on the other hand, the group of experts in the field, which has been selected for this purpose. This selection considered Landeta's (1999) recommendations regarding the number of participants (from 7 to 30), as well as the relationship of the candidates with the subject matter addressed. In addition to these selection criteria, parity between men and women was also taken into account. Finally, after the selection of 16 experts, the group was made up of nine people who took part in the entire process.

The tool submitted for validation by the panel of experts is a questionnaire with 37 indicators distributed in three dimensions. Two rounds of participation were carried out. In each questionnaire administered, the degree of importance of the indicator in each dimension was evaluated by extracting the mean, the mode (importance) and the standard deviation (degree of agreement). The results obtained in the first round have contributed to improving the model, extracting the indicators that have obtained a low valuation, and incorporating others that have been proposed by the panel of experts. The second round has served to consolidate and revalidate the agreements, thus reaching the final proposal for the system of indicators that make up the model.

As a criterion for the inclusion of indicators in the final model, it has been established that the mode must be equal to or higher than 3 (on a Likert scale, from 1 to 5). On the other hand, the items that scored 3 in the second round were included according to their location in the first quartile, i.e., if 75% of the experts rated the item as important or very important. Thus, after this expert phase, the final model consisted of 34 indicators (Figure 2):


**Figure 2.** Indicators extracted from the Delphi method by dimensions. Source: Authors.

### *3.2. Phase 2: Weighting Calculation Using Multi-Criteria Methodology with Stakeholders and AHP*

In this step, a multi-criteria methodology of stakeholder consultation was established, carried out in groups, through the application of a questionnaire that includes basic socio-demographic identification questions and for each indicator of the set of 34 indicators established in the previous phase and that make up the IRISS index. The assessment of the indicators was established on a Likert scale with a score between 1 and 5 points on three different criteria: impact, reversibility and influence.

The criteria considered in this phase were established and defined by the research team, being: (a) the impact that the COVID-19 pandemic has had on the indicator; (b) the

reversibility that each of these indicators has, i.e., the ease of changing to a better or more favourable state over time and (c) the capacity of influence that this indicator has on the social services system.

Eight stakeholder focus groups were carried out with a total of 55 participants, with a gender distribution of 71% women and 29% men, with an average age of 48 years (deviation of 12 years), the age range being between 25 and 80 years. The selection of participants was governed by the principle of accessibility and snowball sampling was used with people linked to regional social services (Andalusia—Autonomous region in southern Spain

The majority (43.6%) are professionals of public social services, 16.4% are professionals in homes for the elderly, and another 16.4% belong to companies/NGOs providing social services. Representatives of local public administration account for 1.8%, the same percentage for professionals of the Home Help Service and service users. Other profiles account for 18.1%, with the majority of users, volunteers, and citizens linked to associations and professional associations.

In order to calculate the weightings to be applied to each indicator, it was also necessary for the research team to establish the weighting, understood as the importance of each criterion in the consideration of the average scores obtained from the questionnaires completed by the stakeholders. The AHP (Analytic Hierarchy Process) methodology, a multi-criteria decision-making method used to calculate the weights of the indicators to be included in the model (Wu et al. 2022), has been used to this end.

The analytic hierarchy process (AHP) is a methodological approach to decision-making that is commonly applied in solving highly complex problems involving multiple scenarios, criteria and actors (Orencio and Fujii 2013). This method, developed by Saaty (1987), establishes a selection process using a structured, hierarchical technique to aid complex decision-making. AHP can be useful for making decisions in complex situations with multiple factors to consider. By breaking down the problem into criteria and alternatives, and assigning weights to each according to their relative importance, a more informed and transparent decision can be reached. There are numerous experiences of administrations, services and research groups linked to the social sciences that have used or are using this multi-criteria analysis and decision-making methodology (see details at Saaty 2008).

The multiplicity of existing methods means that the choice of one of them depends on the context of the study, the variables or categories of choice, as well as the interest and knowledge of the research group and the use in their field or discipline. MCDA techniques and methods of analysis are widely used in the natural sciences, engineering, economics, and tourism, but to a lesser extent they have been applied in the social sciences and less in the field of social services or social work. There is some work on volunteering with AHP (De Llanos 2012), on loneliness in older people (Li et al. 2023).

While it is true that of the set of methods reviewed, the AHP method is used in the analysis of the health-safety and environmental risk assessment of refineries for the location of the power plant, the risk factors such as health-safety risk, technology risk, etc. (Rezaian and Jozi 2012). Our design and construction of the SSRI index stems from the transfer of the HCVRA method from the environmental sciences to the social sciences, so it makes sense to use this type of hierarchical analysis that has been used in risk analyses from which we have extracted processes for our work. Furthermore, the systematic review study conducted by Mardania, Jusohb, Nora, Khalifaha, Zakwana and Valipour (Mardania et al. 2015) showed a predominance of this method over other multi-criteria analysis methods.

In addition, important issues for its choice are added such as having a consistency analysis to ensure that decision-makers provide reliable judgments. It helps identify inconsistencies in pairwise comparisons and prompts decision-makers to revise their judgments if necessary. Also, AHP is more oriented towards working with a set of individual provisions, incorporating different decision-makers. This was useful in our process, given that the previous phase was developed using a Delphi methodology that is more group-oriented.

For this purpose, the following process has been followed (according to the guidelines of Aznar and Guijarro (2020) by n × n pairs (where n is the number of criteria):

1. Definition of a matrix of pairs of criteria based on a 9-point scale, where 9 is the maximum value (very important) and 1 is the minimum value (not important at all).
2. Obtaining the normalised comparison matrix (The division of each element (cell of the matrix) by the total sum of its column).
3. Calculation of the average of the rows of the normalised matrix, thus obtaining the weights or priority vector.
4. A matrix resulting from the product of each cell of the initial rating matrix (columns) with the row weight is calculated.
5. Consistency checks to ensure that the defined weights are not completely random. The consistency of the project data has been favourable at 0.05 (being adequate below 0.1 according to Opabola and Galasso (2022).

Finally, the weighting weight to be applied to each indicator is calculated as the product of the average of each indicator in each criterion obtained from the stakeholder questionnaires by the weight of each criterion (impact, reversibility and influence), extracted from the previous AHP process. These 3 are then added together and normalised by standardising them on a scale of 0 to 1, considering the maximum and minimum values of the total set of indicators ($x = (x - \min)/(\mathrm{Max} - \min)$)

### *3.3. Phase 3: Configuration of the Databases, Downloading of Secondary Data, Analysis, Debugging, Filtering of Variables and Elaboration of Indicators*

In this phase, the indicators of the final model were adjusted, eliminating two of them, one from the vulnerability dimension (real estate) for not finding updated data, and another from the resilience dimension (overall funding of social services) for not being accessible. Two others have had to be reformulated due to the impossibility of accessing data on the disabled population at the municipal level. This is the case of the indicators: "Expenditure on Home Help Service with regard to the population with disabilities and the over 65s" and "Home Help Service beneficiaries with regard to the disabled population and the over 65s". In this case, the answer has been to calculate the index using only the population over 65 years of age as a reference. The final total set consists of 32 indicators. The distribution corresponds to 9 indicators for the vulnerability dimension, 6 for hazards, and 17 for resilience. The next step is to download the data from secondary sources, develop the databases and calculate the indicators.

Most of the data have been located in the Andalusian Multi-territorial Information System (SIMA) for the vulnerability and hazard dimensions. This repository brings together an extensive catalogue of indicators from different official sources and offers a level of disaggregation from the European level to the census section. In this case, the chosen data for the model data are at the municipal level. All data have been downloaded for the pre-pandemic (2019) and post-pandemic (2021) periods, although for some data the latest year available is 2020.

The data for the Vulnerability and Hazard dimensions were obtained entirely from the SIMA, while those for the Resilience dimension were obtained mainly from the statistical information on community social services published by the Andalusian Regional Government through the Department of Social Inclusion, Youth, Families and Equality in the Netgefys database. It should be pointed out that some indicators of the resilience dimension that come from this autonomous regional base of social services are only available for local councils, which leads us to obtain these data only for municipalities with more than 20,000 inhabitants, which in Andalusia are a total of 84, for which the complete risk model has been calculated. Table 1 (in the following section) shows the final set of indicators included in the model according to the dimension to which they belong, the way they have been calculated, the reference years and the source from which they have been extracted. The last five indicators of the resilience dimension are only for the risk index of social services for older people.

### 3.4. Phase 4: Standardisation and Weighting of Indicators

Once the indicators have been calculated from formulas with the available secondary data, the investment is made for those that have been agreed by the research team to be oriented in an inverse interpretation of risk. In other words, those indicators where a higher score is more beneficial for the system have been maintained with direct data, while those where a higher score would imply a higher risk have been inverted. The following table (Table 1) shows whether the indicators have been maintained with direct scores or inverted.

**Table 1.** Indicators of the SSRI model by dimensions.

| | Indicators | Indicator Construction | Relation | Years | Font |
|---|---|---|---|---|---|
| VULNERABILITY | Vegetative growth | Births-Deaths | Direct | 2019 and 2021 | Andalusian Institute of Statistics and Cartography. Natural Population Movement |
| | Ageing index | Percentage of the population aged over 64 over the population aged under 16 on 1 January of year | Inverse | 2019 and 2021 | Andalusian Institute of Statistics and Cartography. Exploitation of the Municipal Register of Inhabitants of the INE. |
| | Elderly dependency ratio | Ratio of the population aged over 64 to the population aged 16 to 64 on 1 January of year t, expressed as a percentage of one hundred. | Inverse | 2019 and 2021 | |
| | Foreign population | Foreign population/Total population × 100 | Direct | 2019 and 2021 | |
| | Temporary employment | (Temporary contracts/total contracts) × 100 | Inverse | 2019 and 2021 | Institute of Statistics and Cartography of Andalusia from the Public State Employment Service and the Andalusian Employment Service. |
| | Temporary employment for women | Temporary contracts to women out of the total number of contracts to women | Inverse | 2019 and 2021 | |
| | Employment of the foreign population | No. of contracts to foreigners out of the total foreign population (%) | Direct | 2019 and 2021 | |
| | Registered unemployment by sex | Registered unemployed in relation to the working age population (15–64 years) | Inverse | 2019 and 2021 | |
| | Percentage of part-time contracts | Part-time contracts/Total contracts × 100 | Inverse | 2019 and 2021 | |
| HAZARDS | Current budget surplus or deficit | Difference between the liquidated budget of revenue and the liquidated budget of expenditure. | Direct | 2019–2021 | Institute of Statistics and Cartography of Andalusia |
| | Population density | Inhabitants per square kilometre of territory | * non-linear relationship | 2019 and 2021 | Institute of Statistics and Cartography of Andalusia |
| | Average Net Income declared | Ratio of total net income declared to the number of declarations. | Direct | 2019 and 2020 | Institute of Statistics and Cartography of Andalusia |
| | Diversity of productive sectors | No. of contracts by sector (large groups) The Inverse of the HH index is calculated *. | Direct | 2019 and 2021 | Institute of Statistics and Cartography of Andalusia |
| | Rental housing price index | Monthly rent according to $m^2$ (average of the 2 housing typologies: collective and single-family) | Inverse | 2019 and 2020 | INE. State System of Housing Rental Indices (Statistical use of tax sources). |
| | Electricity consumption | Total megawatt hours consumed during the year (all sectors) in relation to the population | Direct | 2019 and 2020 | Institute of Statistics and Cartography of Andalusia. Endesa Power Distribution |

**Table 1.** *Cont.*

| | Indicators | Indicator Construction | Relation | Years | Font |
|---|---|---|---|---|---|
| RESILIENCE | Social facilities per inhabitants | Ratio between the total number of social service centres and the population (expressed in per thousand) | Direct | 2021 | Institute of Statistics and Cartography of Andalusia Department of Social Inclusion, Youth, Families and Equality |
| | Primary Care (PC) resources or equipment | Ratio between the total number of Primary Care centres and the population (expressed in per thousand) | Direct | 2021 | Institute of Statistics and Cartography of Andalusia Department of Health and Families. Primary Care Information System (SIAP) |
| | Definitive budget for social services per inhabitant per year | Total budget for community social services in relation to population (per inhabitant per year) | Direct | 2019 and 2021 | Statistical information on community social services (Department of Social Inclusion, Youth, Families and Equality) |
| | Funding from user's contribution per inhabitant | Client contributions to the financing of the social services System as a percentage of total contributions (%) | Inverse | 2019 and 2021 | |
| | Total benefit expenditure per 1000 inhabitants | Total expenditure on all social services benefits in relation to the population (per thousand) | Direct | 2019 and 2021 | |
| | Total users in relation to population | Number of users of the total number of primary social services in relation to the population (per thousand) | Inverse | 2019 and 2021 | |
| | Number of technical workers in social services in relation to population | Total number of technical workers in social services in relation to the population (per thousand) | Direct | 2019 and 2021 | |
| | Expenditure on benefits not including Home Help Service benefits per 1000 inhabitants | Total expenditure on all social services benefits, excluding the provision of the Home Help Service in relation to the population (per thousand) | Direct | 2019 and 2021 | |
| | Expenditure on complementary benefits per 1000 inhabitants | Total expenditure on all benefits considered to be supplementary in relation to the population (per thousand) | Direct | 2019 and 2021 | |
| | Users not including Home Help Service users in relation to the population | Number of beneficiaries per 1000 inhabitants of the total number of primary social services, excluding the Home Help Service. | Inverse | 2019 and 2021 | |
| | Users of complementary benefits in relation to the population | Number of beneficiaries of supplementary benefits per 1000 inhabitants | Inverse | 2019 and 2021 | |
| | Home Help Service expenditure in relation to population | Spending on the Home Help Service per thousand inhabitants | Direct | 2019 and 2021 | |
| | Users of the Home Help Service in relation to the population | People using the Home Help Service as a percentage of the total municipal population, expressed per 1000 inhabitants. | Inverse | 2019 and 2021 | |
| | Percentage of people over 65 years of age among the total number of users | Persons over 65 years of age beneficiaries of social services over the total number of beneficiaries expressed as a percentage. | Inverse | 2019 and 2021 | |

**Table 1.** *Cont.*

| | Indicators | Indicator Construction | Relation | Years | Font |
|---|---|---|---|---|---|
| RESILIENCE | Percentage of people over 65 years old who are users of social services in relation to the total population over 65 years old. | Persons over 65 years of age benefiting from social services as a percentage of the total population over 65 years of age expressed as a percentage | Inverse | 2019 and 2021 | Statistical information on community social services (Department of Social Inclusion, Youth, Families and Equality) |
| | Spending on Home Help Service in relation to the elderly population | Expenditure on the Home Help Service per thousand inhabitants of the total population of people over 65 years of age. | Direct | 2019 and 2021 | |
| | Users of the Home Help Service in relation to the elderly population | Beneficiaries of the Home Help Service out of the total population of people over 65 years of age. | Inverse | 2019 and 2021 | |

* The midpoint of the variable has been considered as the optimal point. Source: Authors.

The indicators are then normalised by standardising them on a scale of 0 to 100. This normalisation is carried out using the formula of minimum and maximum of the set of indicators (x = (x − min)/(Max − min)). Subsequently, the weighting calculated from the multi-criteria methodology of stakeholder consultation is applied. With this step, the final weighted indicators are obtained in order to proceed to the calculation of the indices required in the model.

### *3.5. Phase 5: Calculation of the Indices and the Final SSRI and Impact Level Pre and Post-COVID*

The weighted indicators are used to calculate the indices of each dimension that make up the SSRI index, which is calculated as the average of the scores of the set of indicators that make up each dimension. The vulnerability index, the threat index and the resilience index are obtained for the pre-COVID (year 2019) and post-COVID (year 2021) situations. The formula to be applied for each of the dimensions is (2):

$$iD = \sum(\mathrm{i} = 1) \quad \hat{}\mathrm{n}|\frac{(\mathrm{xi\ pi})}{N}| \tag{2}$$

where:

*iD*: is the index of each dimension (vulnerability, hazard or resilience).
xi: is the value of the variable (n variables)
pi: is the value of the weighting for each variable
*N*: is the total number of variables

Finally, the final calculation of the SSRI is made by multiplying the vulnerability index by the hazard index (1), divided by the resilience index. This SSRI is calculated for all social services in the pre- and post-COVID-19 situation and is also calculated for the reality of services for the elderly (pre- and post-COVID-19) with the inclusion of the last five indicators of the resilience dimension.

The final step is to calculate the impact of the COVID-19 pandemic on Community social services and social services for the Elderly, with the ratio of post-COVID SSRI to pre-COVID SSRI.

## 4. Discussion

Current contexts are complex and dynamic, and the pandemic that we have experienced has highlighted the essential nature of social services, as well as the relevance of being able to manage crisis situations by making strategic, effective and efficient decisions. The methodology transferred and adapted from the HVCRA from the environmental and ecological sciences to the social sphere is an advance for the reality of social services by developing an approach and work that contemplates elements of vulnerability, threats,

and aspects of resilience, and will enable the generation of diagnostic knowledge for this decision-making, as well as assessing the impact and modifications in the system at a territorialised (municipal) level.

The three-dimensional consideration, with a strong load of indicators in the resilience dimension, allows for a complex approach to risk measurement in the field of social services, with a disparity of heterogeneous yet parsimonious indicators for the generation of a feasible model for use in this field at a territorialised level. The model is intended to be transferable and useful for strategic decision-making in social systems and services at the municipal level, considering the complexity of the contexts and the system itself. Indicators have been incorporated that are made up of data from public and accessible secondary sources. This relevance given to the resilience dimension is because it is made up of indicators specific to the social services system, which refer to financing, expenditure, the proportion of users, technical professionals, indicators on older persons and different services. This is important because the General Council of Social Work (as pointed out by Gijón and García 2022) insists on the need to reinforce professional teams, increase budgets, and promote social measures in the face of foreseeable adverse circumstances. Otherwise, "it is possible that the impact of social services on the user population will be delegitimised and without the necessary social support to be considered as a truly essential service in the post-COVID stage" (Gijón and García 2022, p. 346).

The clearly defined phases of the construction of the SSRI index have allowed progress to be made with marked milestones. The relevance of involving experts in the Delphi phase and stakeholders for the multi-criteria methodology demonstrates the dynamic legitimacy of the process and the final indicators of the model, as well as the continuous review by the research team in the validation of the results of each stage. The participation of key actors and experts is widespread in environmental and business issues or Corporate Social Responsibility but is not so widely used in the specific field of social services. However, several authors advocate the suitability and the need to build batteries or systems of indicators where there is the participation of different key actors or stakeholders (Torabi Moghadama et al. 2016; Lützkendorf and Balouktsi 2017). In addition, there is specific work on this participation in studies on territorial vulnerability with factors from different spheres in Spanish cities (Ruá et al. 2019). When talking about vulnerability, it is common to also find a focus on the resilience dimension. This link between vulnerability and territorial resilience has been addressed by Hadjimichalis (2011) or Pendall, Theodos and Franks (Pendall et al. 2012) among others. All of this is applicable and scalable to the field of social services, both community and elderly, adjusting to a municipal territorial dimension.

COVID-19 highlighted the essential role of social services in dealing with extremely virulent, new and unforeseen situations caused by the pandemic. Crisis situations were experienced that have had consequences of various types and natures and that have generated challenges for protection systems, citizens, professionals, and the structural dynamics themselves. Since then, there have been studies on how to deal with the reconstruction of services, interventions, the generation of new dynamics and the development of resilient services. From more optimistic approaches, redefining to a certain level the necessary social order, with social, labour, ecological, etc., changes. Other scenarios allude to an increase in exclusion and those who speak not only of an increase but of new forms of poverty and vulnerability (Pérez-Sainz 2021). Along these lines, there are authors who talk about the need for Social Work to think about and creatively generate a new future in order to provide effective responses to the population, especially the most vulnerable, who have also been the hardest hit on many occasions by the pandemic (Nomen 2021). For authors such as Singer (2020), the new contexts are new possible worlds where discomfort, the need for new filters and prisms of intervention and action and the increased use of technologies and the digital world challenge all processes.

Within this framework, this project generates the index of risk measurement in social services (SSRI) that allows for a diagnostic approach based on knowledge of the reality of social services at the municipal level (territorialised), from a logic of prevention, of updated

knowledge connected to the context, with accessible indicators, and which allow for the design and management of decision-making in the system, in its different aspects.

The usefulness and implications are established with this diagnostic knowledge of weaknesses (vulnerabilities and threats) as well as potential elements and strengths (resilience), as well as allowing for strategic technical and political decisions in the prospective vision of future crises. In addition, this knowledge will allow working on elements of political planning of changes in the face of detected needs.

Therefore, having such a risk index calculation tool can help to target interventions and allocate resources more effectively. It is possible to better identify relevant risks, their likelihood of improvement (including by reviewing the history of available data) and their impact. With the resilience dimension in place, it is also possible (as with vulnerability and hazards) to disaggregate the analysis and assess risk tolerance levels. Technical and policy decisions will be better and more informed and can and should be complemented by qualitative elements of the local social services and municipality's own dynamics.

It is important to note that the measurement of risk in the field of social services is a dynamic and continuous process, which is why it is necessary to update the data on an individual basis. This has been considered in the construction of the index as a criterion for the accessibility of secondary data at the public level.

This will connect territorial and social services with elements of SDG targets, access to public funds for projects (e.g., Next Generation funds), and local decisions for action.

## 5. Conclusions

This article sets out in detail the original framework and methodological process followed to construct and design the risk measurement index in social services at a territorialised level at the municipal level. It is a pilot model applied to both community social services and social services for the elderly.

The calculation of this index is proposed for the pre- and post-pandemic situation of COVID-19. This index is based on first-order indices such as the vulnerability, threat and resilience indices. The calculation of these indices, and of the final index of SSRI and the calculation of the impact of COVID-19 is oriented towards a greater and better knowledge of the dynamics of municipal social services. This allows priorities and intervention measures to be established with the localisation of the risk of greater or lesser importance, and being able to identify on which dimension and specific indicators improvement actions should be focused; the development of local policies, among other alternatives and solutions. It is a model that was created with the intention of being useful for scientific knowledge, for professional diagnosis and for professional and political management and decision-making.

This SSRI is based on indicators of the contextual reality, of social, economic and socio-demographic spheres that make it a useful tool, as well as an up-to-date one given the availability of the data from which it draws.

*Limitations and Future Lines of Work*

The intention to build and design a useful model for measuring risk in social services, with parsimonious indicators, constructed with accessible data, has meant that other indicators of interest have been left out, while the availability of data on resilience indicators has only allowed the calculation for municipalities with more than 20,000 inhabitants. This limitation was assessed by the research team, which agreed to establish the model in this way, given the maximum relevance of the set of indicators relating specifically to the social services system itself. The way to overcome this limitation is to provide all the information detailed in this article, so that interested municipalities that do not have these data publicly available (having less than 20 inhabitants) can add them "manually" and use the model adapted and adjusted to their municipal social services systems.

The main future line of action is the design and dissemination of a consultation application of this territorialised model of risk in community social services, on which the research team is already working at the same time as the dissemination of the results of the

calculated impact. However, it was considered necessary to disseminate the model itself and its construction process at a scientific level, so that it can be understood and replicated in other contexts.

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