ISSN 2013-9004 (digital); ISSN 0210-2862 (paper)
https://doi.org/10.5565/rev/papers.2985

Analysis of social exclusion using social services data records based on the SiSo tool

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Received: 29-05-2021
Accepted: 28-01-2022
Published: 22-04-2022

Recommended citation: Carbonero Muñoz, Domingo; Raya Diez, Esther; Ruiz Vega, Agustín (2022). "Analysis of social exclusion using social services data records based on the SiSo tool". *Papers*, 107 (2), e2985. https://doi.org/10.5565/rev/papers.2985

Abstract

This article aims to identify factors associated with social exclusion among users of social inclusion programs according to four levels of severity. To this end, the SiSo tool was used to assess situations of social hardship on the inclusion/exclusion spectrum. This tool has been used since 2017 to evaluate and study cases in first level or primary care social services in the region of Castilla-La Mancha, Spain. At the time of writing, a total of 18,968 family units have been assessed. Bivariate analyses were performed to identify the main characteristics of users in six dimensions or life domains. The results show that principal component analysis is suitable for identifying the variables in the respective domains. Finally, a multinomial analysis was performed to determine the importance of the variables according to levels of hardship. The findings can be useful for segmenting family units and defining social services interventions by level of hardship, as well as for conducting joint interventions with other social protection systems.

Keywords: assessment; diagnosis; social services; social work

Resumen. *Estudio de la exclusión social a través de registros de datos de servicios sociales: análisis a partir de la herramienta SiSo*

Este artículo tiene como objetivo identificar los factores relativos a la exclusión social atendiendo a cuatro niveles de gravedad entre la población usuaria de programas de inclusión social. Para ello, se realiza un análisis de la base de datos perteneciente a la herramienta SiSo de valoración de las situaciones de dificultad social en el eje inclusión/exclusión. Dicha herramienta se emplea desde el año 2017 en la valoración y el estudio de casos en los servicios sociales de primer nivel en Castilla-La Mancha. En el momento de realizar este artículo, se han valorado un total de 18.968 unidades familiares. Para ello, se recurre a análisis bivariables con los que identificar las principales características en seis dimensiones o ámbitos vitales. Asimismo, los resultados recogen la adecuación del análisis de componentes principales a los respectivos ámbitos vitales. Finalmente, el apartado de resultados recoge un análisis multinomial para determinar su importancia según los niveles de dificultad analizados. Las conclusiones del artículo son relevantes para la segmentación en el primer nivel de atención de los servicios sociales según los niveles de dificultad, con repercusiones en la precisión de necesidades y en la intervención conjunta con otros sistemas de protección social.

Palabras clave: valoración; diagnóstico; servicios sociales; trabajo social

Sumario

1. Introduction

In recent decades, social exclusion has become a salient topic in the sociological and statistical literature. In Spain, some of the most important studies in this line include those of the Observatory on Processes of Social Exclusion and Social Inclusion (Federación Sartu, 2002), the Observatory on Social Exclusion at the University of Murcia (Hernández, 2014), and the Observatory of the Social Reality of Navarre; reports on exclusion published by the Center for Documentation and Research (Social Information and Research Service [SIIS], 2020), national and regional reports issued by the Foundation for the Advancement of Social Studies and Applied Sociology (Fundación FOESSA, 2014; 2019), and surveys conducted by the Spanish National Statistics Institute (Instituto Nacional de Estadística [INE], 2020). This literature, together with specific research, provide snapshots of situations of exclusion or risk of exclusion (Fundación Alternativas, 2020; Cabrera et al., 2008; Subirats et al., 2004; Zugasti & Laparra, 2017). However, there is a lack of systematic, valid, and reliable information on the situation of assisted individuals in the social services system based on professional case records, which can serve to guide social policies.

Social protection systems, both those in which social workers intervene and those involving other social action professionals, manage a large amount of information when making social diagnoses. In the specific case of social exclusion, systematized tools are needed to perform diagnoses and social assessments and identify aspects relating to the heterogeneous, dynamic, and multidimensional nature of exclusion (Díaz & Fernández, 2013).

Such an approach is in line with the principles of evidence-based policy, good governance, and guaranteeing the rights of the most vulnerable sectors of the population (Buchanan, 2009; Pereñíguez, 2012). To enable the early detection of different atrisk subgroups, reduce waiting times through early interventions, and adequately allocate resources, professional decisions and judgments must be grounded in solid knowledge and reasoning (Taylor, 2012). To achieve this, data need to be converted into information and knowledge and put at the service of social intervention processes (Rodríguez et al., 2019).

In Spain, several regions have developed tools to perform diagnoses at the primary care level of social services interventions (Basque Government, 2014; PACT-Project, 2017). In particular, the SiSo tool offers certain advantages over previous tools due to its higher acceptance among professionals, ease of use, and statistical validation. The use of SiSo among social services professionals and its application to social intervention increases the availability of information obtained at the primary social services level, while the simplicity of the information contained in the SiSo tool facilitates its use during social interventions. Moreover, the statistical validation presented in this article justifies differentiating these interventions by level of hardship. This last aspect is of interest for the design of social services policies, as it facilitates the implementation of prevention measures and the identification of users that suffer the most hardship, thus improving the effectiveness of social services policies.

Social exclusion is a phenomenon that affects an increasingly large sector of the population and has progressively worsened during the recent periods of economic crisis. From 2012 to the present, around 12 million people in Spain have been identified as being below the at risk-of-poverty and social exclusion rate (AROPE) (Eurostat, 2021a). Additionally, public funds to alleviate these situations are very limited, with a budget of 54.78 euros per capita in 2018, an amount that has remained unchanged for the last six years (Eurostat, 2021b). In short, due to the lack of funds and the growing demands of people in need, indicators that can help manage these limited resources more efficiently are essential.

The classification of social exclusion by severity levels has already been used in public policy design (Atkinson et al., 2002; Paugam, 1993; Castel, 2014; Laparra & Pérez, 2008). Following this research tradition, this paper advocates the use of social services data records, in this case from the SiSo tool, as a novel way to diagnose levels of hardship. This article is in line with other research that has employed social services records for the creation of knowledge applied to social interventions (Riba et al., 2011; Lavía et al., 2014).

The systematic analysis of such information enables identifying dimensions that better explain these situations, as well as priority areas for intervention according to users' level of hardship. Consequently, it is possible to integrate micro and macro levels of social intervention with the single objective of improving the living conditions of the most vulnerable. The systematic collection of information makes it possible to obtain feedback for diagnoses, and identify and examine the benefits of such interventions for families (Kum et al., 2015).

This article is divided into five sections. The first section describes the diagnostic tools used in primary care social services as part of the social protection system. According to the Spanish legislation concerning social services, primary care is delivered by publicly owned and managed services that constitute the first level of care and must be made available in all areas of a region (Casado, 2010; Anaut & Lopes, 2019). The second section of the paper presents the specific objectives and a research hypothesis. The third section describes the research method, the sources of information used, the collection of data from the primary care centers of the Regional Government of Castilla-La Mancha, and the statistical models used for the analysis. The fourth section of the article presents the results of the analyses in relation to the research objectives. The conclusions section highlights the characteristic elements of each level of hardship with a view to guiding social policies and underlines the importance of using information from social services data records for both primary care interventions and those coordinated with other systems to improve social care.

2. Diagnosis in primary care social services

Diagnosis is an essential element of social work intervention processes (García, 2008; Díaz & Fernández, 2013; Cury & Arias, 2016; Ormaetxea et al., 2020; Raya et al., 2020). However, the adequacy of social diagnostic tools in primary and specialized care in social services has been questioned. According to the review by Cury and Arias (2016), the purpose of social diagnosis is linked to certain aspects of social work intervention methods, such as their mandatory nature and the right to information, assessment, diagnosis, and guidance in the social services field.

The diagnostic approach and its application in the field of social services have been studied by various authors, who have highlighted the relationship between the synthesis, interpretation, and conceptualization of social needs (Rosell, 1990; García, 2008; Díaz & Fernández, 2013). In this regard, several authors have pointed to the need for a systematized tool that can be used to access or provide benefits and services, as well as make professional decisions (Díaz & Fernández, 2013; García & Ramírez, 2009), while taking into account the "relational and cooperative dimension that the encounter between the professional and the service user in the framework of a supportive relationship implies" (Cardona et al., 2017: 70). In the diagnostic process, communication, information, and assessment techniques all come into play (Raya et al., 2020).

Social Services Law 14/2010 of the Regional Government of Castilla-La Mancha contemplates real-world study with the dual purpose of advancing social services knowledge and meeting users' needs in a comprehensive manner. The content of this law includes both the assessment, diagnosis, and detection of situations of need as part of the functions of primary care social services. Moreover, both study and assessment correspond to a technical service that facilitates the allocation of social benefits relating to prevention and comprehensive care in situations of social exclusion.

Diagnoses and assessments in primary social services contribute to defining those questions that correspond to the social services system itself and those that are shared jointly with other areas of social protection (Aguilar, 2014; Martínez & Pérez, 2018; Pérez et al., 2019; Minas, 2014; 2016). In short, this information is useful for defining social services interventions and interventions conducted jointly with other social protection systems.

The notion of inter-institutional cooperation implies a global perspective of social exclusion issues (Duque, 2014; Fantova, 2017; Manzano et al., 2019). In this regard, the severity of situations needs to be determined in order to provide support to access services, adapt interventions, and improve the provision of other services.

To this end, the general provisions of Law 14/2010 include agreements on healthcare, housing, education, equality, and employment. These agreements are inspired by aspects relating to transparency, rationality, and planning. Some of the aspects included in this law correspond to comprehensive, joint care in the field of social and healthcare services, although the guiding principles contemplate the creation of comprehensive programs through the mainstream social services network.

Inclusion services and programs are designed based on an integrated approach involving both mainstream and specialized social services networks (Zalakain, 2020). These programs are structured in individual packages to respond to both general needs and those of specific groups. Integrated social services aim to address the needs of individuals who use several services simultaneously. Some examples include one-stop-shop experiences; a combination of employment, income, and social services; social services and health; or social services and housing (Pérez et al., 2019; Minas, 2014; 2016; Duijn et al., 2018). Zalakain (2020) also includes tools for assessing, classifying, and profiling the population to identify the skills, knowledge, attitudes, and other characteristics of service users to combine programs of greater or lesser intensity or the support needed according to the diagnosis made.

Manzano et al. (2019) examined the development of tools to structure and organize services for longtime users, as well as the segmentation and screening of cases in different stages of the intervention process. Similarly, Moore (2019) analyzed the practice of segmentation in relation to detection, early intervention, and intervention effectiveness. Other authors have highlighted the importance of addressing critical points, service traceability, and continuous diagnostics programs (McBeath et al., 2018).

These aspects serve to comprehensively address processes of social inclusion. Orbergozo (2016) highlighted the drawbacks of using study and diagnostic tools in social services. Among others, these include their limited use due to work overload, lack of time, and perceived problems regarding their usefulness. However, the experience with the SiSo tool in Castilla-La Mancha shows high levels of use and acceptance by primary care professionals (Raya & Real, 2020). The speed of the application, its versatility, and the immediate return of a case report after completion may be some of the reasons for its acceptance (Raya et al., 2020).

3. Objectives and hypothesis

This study uses the database generated by the SiSo tool, which includes case studies and diagnoses performed by primary care social service professionals in Castilla-La Mancha. The research objectives are as follows:

— Objective 1. Compare levels of hardship and differences in life domains by hypothesis testing.
— Objective 2. Identify the nature of the variables involved in determining levels of hardship by means of six principal component analyses.
— Objective 3. Determine the factors involved in determining the four levels of hardship according to their importance in the different life domains.

Hypothesis 1. The level of social hardship differs according to the nature and intensity of the factors, taking into account primarily economic, employment, education, health, housing, and relational aspects (Cabrera et al., 2008; Hernández, 2014; Laparra & Pérez, 2008; Paugam, 1993; Castel, 2014; Raya & Real, 2020; Atkinson et al., 2001; Subirats et al., 2004).

Hypothesis 1 is based on the methodological implications of multidimensionality and heterogeneity (Laparra et al., 2008). A comprehensive and global approach to diagnoses includes broad aspects such as the incorporation of economic, employment, relational, and community issues, as well as access to social protection institutions (Ormaetxea et al., 2020; Cury & Arias, 2016). In turn, the identification of heterogeneous or differential situations according to levels of hardship is relevant for the prioritization of social services policies and the fight against poverty. These decisions must be based on empirical evidence, although appropriate decision making is essential in contexts characterized by high poverty rates and low social spending on social inclusion policies (Ferrera, 1996; Gough, 2001). The identification of levels of hardship according to severity is linked both to adapting interventions to the severity of cases and to possible joint actions with other social protection systems (Zalakain, 2020; Manzano et al., 2019; Moore, 2019; Taylor, 2012; Laparra & Martínez, 2021; Minas, 2014; 2016; Duijn et al., 2018).

Briefly, the stages of the research are as follows. We first present a descriptive analysis of the population groups according to level of social hardship.

An explanatory analysis of the aspects involved in processes of social hardship is then provided. Lastly, explanatory and predictive evidence is presented to identify priority lines of action.

4. Methodology

The SiSo tool implemented by the Department of Social Welfare of the Regional Government of Castilla-La Mancha in May 2018 was used to conduct the analysis (Raya & Real, 2020). From that date until the time of writing, a total of 18,968 social services records have been completed, representing 0.93% of households in the region and 88.94% of open cases with interventions designed to deliver social exclusion benefits.

The unit of analysis comprises the case records available in the SiSo database and includes the households served by primary social services. When assessing situations of social hardship, the situation of the entire household is taken into account and the sociodemographic data of the primary earner are collected. The tool consists of three types of variables related to level of hardship, sociodemographic characteristics, and social interventions (Raya & Real, 2020).

Twenty-five variables were organized into different domains and defined operationally on a scale in the form of a rubric as described in the SiSo procedure manual. The variables were ordered by increasing levels of social hardship. In the development of the construct to quantify situations of social hardship, a weighting was given to issues according to their severity in line with previous studies (Federación Sartu, 2002; Hernández, 2014). Thus, a higher weighting was given to variables of a structural nature (economic situation, employment situation, and housing) due to their impact on situations of exclusion; an intermediate weighting was assigned to those relating to health, and a lower weighting was assigned to variables of a personal nature (education and relationships). The weighted values are shown in Table 1.

The dependent variable represents the level of social hardship and is defined as the accumulation of situations affecting the household in relation to multidimensional processes of social inclusion/exclusion. The variable is

Table 1. Weighted values for the dimensions of the SiSo scale

	Social hardship			
Dimensions	Low ardship	Moderate hardship	High hardship	Very high hardship
Economic Employment Housing	0	2	4	6
Health	0	2	3	4
Education Relational	0	1	2	3

Source: Regional Government of Castilla-La Mancha (2018). *SiSo Tool Procedure Manual*.

Table 2. Population distribution by level of hardship

Level	Score on SiSo scale	N	%
Low hardship	Less than 28 points	606	3.2
Moderate hardship	29 to 57 points	10,644	56.1
High hardship	58 to 85 points	7,290	38.4
Very high hardship	86 points or more	428	2.3

Source: Regional Government of Castilla-La Mancha (2018). *SiSo Tool Procedure Manual.*

constructed from the weighted value obtained from the sum of the items. Four levels of hardship were established according to the accumulation of indicators and assigned a score on the scale. To determine the levels of hardship, Delphi assessments made by experts in the SiSo design stage were considered. Table 2 shows the scores for each level of hardship and their percentage distribution among the study population.

4.1. Data analysis

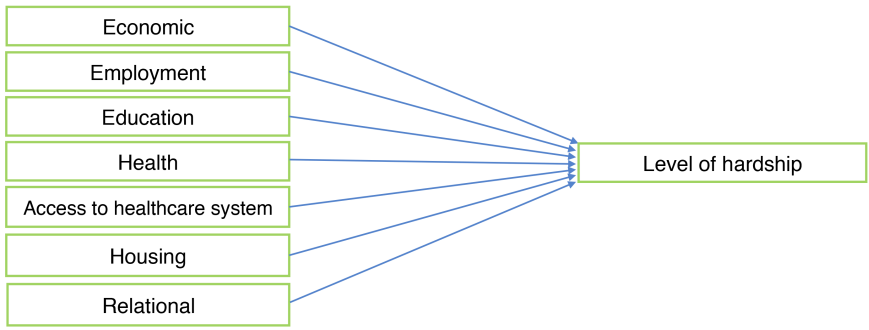
Three analyses were performed:

— First, a descriptive analysis was performed to identify the distribution of the population with respect to the levels of social hardship previously defined by the research team, as well as the sociodemographic characteristics of the population and the households served. As a result, objective 1 was achieved, that is, significant differences were verified in the variables according to levels of hardship. For the descriptive analysis, the median was calculated to obtain the value that separates half of the population, and a hypothesis test was performed using Chi-square and its associated significance to detect the level of significance in the differences according to levels of hardship.

— Second, a linear principal component analysis (PCA) was performed. PCA is useful for reducing the number of variables and addressing the parsimony criterion, i.e., choosing the simplest explanation that can explain the data. By using a smaller number of variables, the aim was to explain the maximum level of information contained in the data (Pardo & Ruiz, 2005). To this end, an analysis was performed for each dimension (economic, employment, education, housing, health, and relational) and the variables that explain the levels of hardship were identified (objective 2). For the dimensions in which more than one solution was obtained, varimax rotation was used.

— Third, a causal analysis was performed using the multinomial logit method to explain the value of the independent variables for each level of hardship and to test the explanatory and predictive capacity of the model (objective 3). The purpose of multinomial logistic regression is to perform predictive analyses (Riba et al., 2011). In this case, it was used to quantify and explain the dimensions according to level of hardship. As a result, the categorical variable

Figure 1. Model of analysis by level of hardship



Source: The authors based on the study results.

captured four levels of hardship: low, moderate, high, and very high. These differences were studied according to the seven independent variables obtained by PCA. It should be noted that the independent variables were interpreted taking the lowest level of hardship as the reference category from which changes and movements in the other levels were analyzed (Figure 1).

The information was analyzed using the SPSS Version 26 (Statistical Package for the Social Sciences) and R programs.

— Multinomial logit regression was used due to the absence of a linear relationship between the indicators and the estimated level of social hardship. In a first stage, the variation in level of hardship increased more than proportionally through the variation of the indicators (López & Fachelli, 2015). In a second stage, the relationship between the causes and the consequence became increasingly bounded and took the shape of a logistic curve (instead of a linear relationship). A second reason for using this analysis technique was to calculate the probability of each individual user suffering some level of hardship according to the identified causes.

— Causal models are very sensitive to multicollinearity effects and relationships between variables. To apply a technique of this type, the causal variables must be independent of each other. Thus, an analysis was performed taking into account the relationship of each variable with the model. To this end, a variance inflation factor (VIF) ranging from 1.125 to 1.545 was used. These values differ substantially from the minimum of 5 proposed by Kleinbaum et al. (1988). In line with these authors, the coefficients of determination in the calculation of VIF are low (below 0.80).

5. Results

5.1. Sociodemographic description of the population

The characteristics of the primary earners and the households for which the SiSo scale was used to assess situations of social hardship are shown in Table 3.

Table 3. Sociodemographic characteristics of the population

Aspect	Variable	Values	Percentage	N
Sociodemographic characteristics of primary earners	Sex	Male	35%	6,646
		Female	62%	11,760
		No data	3%	562
	Age	18-29 years	8.8%	1,669
		30-44 years	33.2%	6,297
		45-64 years	44.9%	8,517
		65 and over	10.4%	1,973
		No data	2.7%	512
	Country of birth	Spain	65.7%	12,800
		Other countries	28.8%	5,661
		No data	2.7%	507
	Province	Albacete	26.6%	5,055
		Ciudad Real	26.3%	4,995
		Cuenca	9.3%	1,765
		Guadalajara	9.6%	1,822
		Toledo	26.7%	5,074
		No data	1.4%	257
Household characteristics	Single-parent household	Single-parent household	33.3%	6,314
	Household size	1 member	26%	4,932
		2 members	22.9%	4,344
		3 members	20.1%	3,813
		4 members	15.2%	2,883
		5 members	8.9%	1,688
		6 members or more	5.2%	986
		No data	1.7%	322
	Number of children	0	46.4%	8,804
		1	22.9%	4,347
		2	18.2%	3,446
		3 or more	12.5%	2,371

Source: The authors based on the results.

As can be seen in the table, there is a higher percentage of women (62%) and people born in Spain (65.7%) among the primary earners. Likewise, those aged 45-64 years comprise the largest age group (44.9%). The data by province are distributed as follows: Toledo (26.7%), Albacete (26.6%), Ciudad Real (26.3%), Guadalajara (9.6%), and Cuenca (9.3%). As regards household characteristics, 33% are single-parent households. Single-person households predominate (26%), followed by households with two (22.9%) or three members (20.1%), while more than half of households have children (53.6%).

Based on this first descriptive approximation of the sociodemographic characteristics of the population, the first objective was addressed through hypothesis testing, thus confirming significant differences (p <0.000) for all

the variables analyzed (see tables in Appendix 1, median values shown in black).

An analysis of the entire population shows that the median values of the variables tend to be located in the intermediate values of the scale. In three variables, the median corresponds to the items of maximum hardship. One economic variable (level of income) affects 67.4% of households with incomes below 30% and two employment variables (employment intensity and employment prospects) affect 66.2% and 73.8%, respectively, at their maximum level of hardship. However, an analysis of the values for each level of hardship in the dependent variable shows that the differences increase as the level of hardship increases, thus confirming the hypothesis of significant differences according to level of hardship on the SiSo scale.

In the group with the lowest level of hardship, none of the variables reach the maximum median value on the scale. However, the most affected items correspond to two variables associated with income (level of income and lack of assets) and education (level of education, employment qualifications, and training skills). Among those who suffer the least hardship, three variables reach the maximum median value (level of income, employment intensity, and employment prospects). These items reached values above 55%.

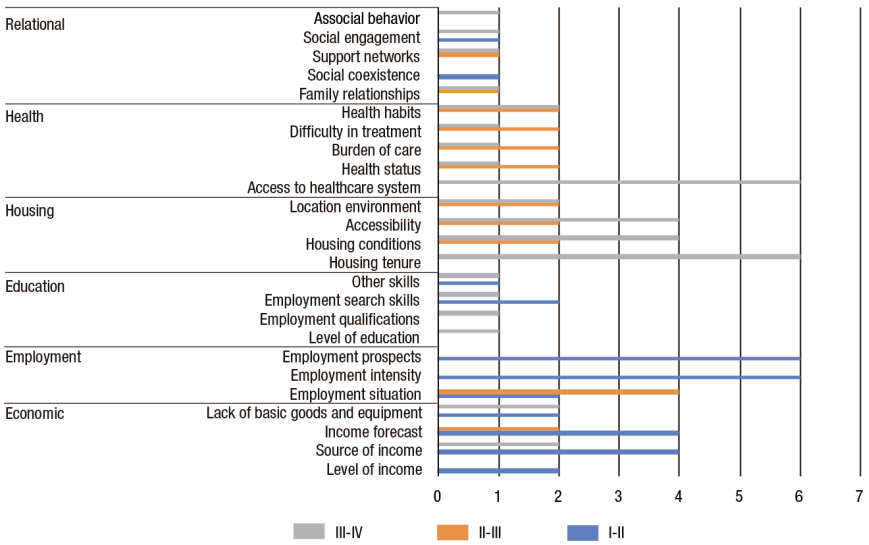
In the group suffering high hardship, five variables present a maximum median score: two economic variables (level of income and income forecast) and the remaining three from the employment domain. The items associated with maximum hardship reach values from 60.2% for households with no income or less than 30% of the median to 90.3% for the unemployed population.

As for the group that suffers the greatest hardship, 16 of the 25 variables reach the maximum median value. Specifically, in the economic, employment, and education domains; two variables in the housing domain (housing tenure and housing conditions); one variable in the health domain (health habits), and two variables in the relational domain (support network and social engagement). For each life domain, the variables with the highest values correspond to 93.7% of individuals with income below 30%, 96.7% without employment, 35% with detrimental health habits, 77.6% without housing or living in inadequate housing, and 68.9% lacking social engagement.

These findings confirm differences between the groups according to the level of intensity of social exclusion. The graphical representation of the distances between the median scores shown below summarizes three types of distances: a) low to moderate hardship, b) moderate to high hardship, and c) high to very high hardship, as well as which variables determine the differences (Figure 2).

The distances between low and moderate hardship are mainly observed in the variables of the economic and employment domains, and to a lesser extent in the education and relational domains. Thus, an increase in distance at the median affects all the variables in the economic and employment domains. Similarly, the variables in the education domain that show the greatest increase are employment search and other skills, whereas social engagement and coexistence increase the most in the relational domain.

Figure 2. Distance between hardship levels according to the medians of each variable



Note: I. Low hardship; II. Moderate hardship; III. High hardship; IV. Very high hardship.

Source: The authors.

The distance between moderate and high hardship corresponds to the variables in the housing and health domains. All the variables increase their distances with the exception of hardship in housing tenure and access to the healthcare system. A difference was also observed in the employment variables, income forecast, and support networks.

Moreover, all the domains show a distance between high and very high hardship except employment, thus confirming the cumulative nature of exclusion. That is, as exclusion intensifies, a greater number of life domains are affected.

Significant differences were found for the association between the demographic characteristics of the primary earner and the cohabiting household and level of hardship. Low hardship is significantly associated with cohorts aged 65 and over (20.8%); provinces Albacete (30.9%), Cuenca (11.7%), and Guadalajara (18.30%); households with four (22.4%) and five members (11.1%); and the presence of two children in the household (25.30%). In this regard, moderate hardship shares some characteristics such as the greater presence of persons aged 65 and over (11.2%), provinces Albacete (28%) and Cuenca (10.2%), and households with four members (16.5%). The analyses point to significant differences with the diagnoses and low hardship, such as the greater presence of age cohorts between 30-44 years (34.7%), households with two (23.8%) and three members (22.1%), and households with one child (26%), respectively.

High levels of hardship are significantly associated with a greater presence of men (37.4%), age cohorts formed by persons aged 18-29 years (10.3%)

Table 4. Sociodemographic characteristics by hardship level

			Low hardship	Moderate hardship	High hardship	Very high hardship	Total	p value
Demographic characteristics of primary earners	Sex	Male	33.8%	32.7%	37.4%	54.9%	35%	0.000
		Female	61.2%	64.3	59.8%	42.3%	62%	
		No data	5%	3%	2.8%	2.8%	3%	
		N	606	10,644	7,290	428		
	Age	18-29 years	6.4%	7.8%	10.3%	12.4%	8.8%	0.000
		30-44 years	38.3%	34.7%	30.7%	31.5%	33.2%	
		45-65 years	30.7%	43.7%	47.7%	46%	44.9%	
		65 years and over	20.8%	11.2%	8.5%	7%	10.4%	
		No data	3.8%	2.7%	2.7%	3 %	2.7%	
		N	606	10,644	7,290	428		
	Country of birth	Spain	63.5%	66.4%	69%	72.4%	67.5%	0.000
		Other countries	32.7%	30.8%	28.5%	24.8%	29.8%	
		No data	3.8%	2.8%	2.4%	2.8%	2.7%	
		N	606	10,644	7,290	428		
	Province	1	30.9%	28%	24.3%	27.8%	26.7%	0.000
		2	11.7%	10.2%	7.9%	8.6%	9.3%	
		3	14.2%	25.5%	28.3%	32%	26.3%	
		4	18.3%	9.9%	8.7%	6.3%	9.6%	
		5	22.1%	25.2%	29.6%	22.7%	26.8%	
		No data	2.8%	1.4%	1.2%	2.6%	1.4%	
		N	606	10,644	7,290	428		
Household characteristics	Single-parent household		28.4%	33.6%	33.4%	30.1%	33.3%	0.095
	Rest of households		71.6%	66.4%	66.6%	69.9%	66.7%	
		N	606	10,644	7,290	428		
	Household size	1 member	16.2%	21.6%	31.5%	56.1%	26%	0.000
		2 members	22.4%	23.8%	22.4%	12.4%	22.9%	
		3 members	19.8%	22.1%	17.7%	9.6%	20.1%	
		4 members	22.4%	16.5%	13.2%	6.5%	15.2%	
		5 members	11.1%	9.3%	8.3%	7.9%	8.9%	
		6 members or more	4.8%	5.3%	5.6%	5.4%	5.2%	
		No data	3.3%	1.4%	1.1%	2.1%	1.7%	
		N	606	10,644	7,290	428		
	Number of children in household	0	39.4%	44 %	54%	73.6%	46.4%	0.000
		1	25%	26 %	21.5%	9.6%	22.9%	
		2	25.3%	20.9%	16%	8.4%	18.2%	
		3 or more	10.34%	9.1%	8.5%	8.4%	12%	
		N	606	10,644	7,290	428	99.5%	

Source: The authors based on the results.

Table 5. Results of the PCA components matrix by dimension

Independent variables	F1	F2	F3	F4	F5	F6	F7
Level of income	0.744						
Source of income	0.817						
Income forecast	0.774						
Severe material deprivation	0.598						
Employment situation		0.801					
Employment intensity		0.838					
Employment prospects		0.752					
Level of education			0.767				
Employment qualifications			0.798				
Employment search			0.810				
Other skills			0.763				
Tenancy regime				0.650			
Housing conditions				0.776			
Accessibility				0.565			
Location environment				0.594			
Access to healthcare system					0.021	0.921	
Health status					0.923	0.104	
Burden of care					0.919	0.089	
Continue treatment					0.773	0.355	
Health habits					0.467	0.637	
Family relationships							0.743
Social coexistence							0.766
Support networks							0.681
Social engagement							0.532
Asocial behaviors							0.628
Percentage	54.46%	63.66%	61.58%	42.42%	50.26%	27.99%	45.60%
KMO	0.71	0.66	0.78	0.60		0.76	0.73
Barlett's test of sphericity	0.000	0.000	0.000	0.000		0.000	0.000

Source: The authors based on the results.

and 45-64 years (11.2%), persons born in Spain (69%), provinces Ciudad Real (28.3%) and Toledo (29.6%), single-person households (31.5%), and households with no children (54%). In turn, households classified as suffering very high hardship share relevant characteristics, such as the presence of men (54.9%), cohorts aged 18-29 (12.4%), persons born in Spain (72.4%), province Ciudad Real (32%), and households without children (73.6%).

5.2. Linear principal component analysis (PCA)

In the second step of the analysis, six PCAs were performed in line with the second research objective relating to the nature of the variables and levels of hardship.

PCA is used for two main purposes: 1) to simplify the data set by reducing the number of variables to eliminate redundancies, given that the initial variables may be measuring the same characteristic and 2) to identify latent structures or factors underlying the data that cannot be observed directly, but need to be inferred from the original variables as they are the result of the iteration of various attributes and characteristics (Trespalacios et al., 2005). This analysis technique has been used in previous research to measure poverty and social exclusion (Meulaman & Heisser, 2005; Pardo & Ruiz, 2005; Paugam, 1993; Subirats et al., 2004; Pérez et al., 2002) and has proven to be relevant for the objectives of our study and the interpretation of the problem. The results show that a single component was obtained for the economic, employment, education, housing, and relational domains. As regards health, two factors relating to health issues and access to the healthcare system were obtained.

Moreover, all the values have a positive sign, indicating the significance of the factors. The results achieved in the communalities – variables reproduced by the factor solution – indicate the importance of each variable in the principal components obtained (Pardo & Ruiz, 2005). On the one hand, the higher the value of the variable, the better its adequacy in the factor. And on the other, the critical level obtained is less than 0.001, which supports the null hypothesis, thus ensuring that the analysis models are suitable to explain the data. In turn, the Kaiser–Meyer–Olkin (KMO) value obtained in the analyses is equal to or greater than 0.6, indicating the significance of the model.

The goodness-of-fit of each variable to the corresponding factor and the explanation of each dimension can be inferred from the six analyses. Thus, the variables that best fit the different factors are source of income (0.817), employment intensity (0.838), employment situation (0.801), employment search (0.810), employment qualifications (0.798), housing conditions (0.776), social coexistence (0.766), and family relationships (0.743).

Regarding health, two different factors were obtained for health status and access to the healthcare system. Firstly, the severity of health issues (0.920) is directly associated with the rest of the variables, except for the variable access to the healthcare system. Secondly, access to the healthcare system is directly associated with the rest of the variables, although the values in the communalities correspond to health habits and treatments. This is not the case with other variables related to health status and burden of care due to health issues affecting a member of the household.

5.3. Global fit of the model by level of hardship

The third step of the analysis was the creation of a multinomial analysis model with which an explanatory capacity exceeding 80% was obtained for all the goodness-of-fit indicators of the model (Pardo & Ruiz, 2005). To this end, the factor scores resulting from the previous analysis were used. It should also be noted that all the independent variables introduced in the model were sig-

nificant in explaining the different levels of hardship, thus indicating that all the theoretical causes explain the levels of hardship.

Before interpreting the results, it is important to recall that low hardship is the reference category and the values obtained in the rest of the hardship levels were interpreted taking this category as a reference. At an aggregate level, an increase was observed in situations of high hardship in the health, housing, and economic domains.

The factor scores obtained in the previous analysis were used in the multinomial analysis. Table 6 presents the main results for the three levels of hardship, using low hardship as a reference category. The aim was to estimate which variables explain the different levels of hardship.

All the goodness-of-fit indicators showed very high values, with a minimum Cox and Snell value of .810 to a maximum Nagelkerke value of .9875, thus indicating the global fit of the model. Moreover, if the tool is used for decision making, the model requires a high predictive capacity. According to Table 6, the overall predictive capacity of the model is 97.6% and is very uniform for the different degrees or levels of social exclusion (ranging from a minimum of 93.6% to a maximum of 98%).

For reasons of space, the sensitivity analysis or odds ratio have not been included. The purpose of such an analysis is to verify changes in probability by level of hardship and predictors of exclusion. The results indicate that the increase in the predictor variables is homogeneous. In other words, in addition to corroborating the increase in values according to level of hardship, these changes occur in a stable manner. Lastly, the typification of the units of measurement made it possible to perform the analysis and the comparison according to causes and levels of hardship.

As the results indicate and taking into account the level of hardship (moderate, high, and very high), the predictor variables correspond at all

Table 6. Main multinomial logit results

	Moderate hardship		High hardship		Very high hardship	
	B	Sig.	B	Sig.	B	Sig.
Constant	48.64	0.000	42.109	0.000	–51.404	0.000
Economic	8.26	0.000	18.857	0.000	35.643	0.000
Employment	6.55	0.000	15.505	0.000	26.845	0.000
Education	4.98	0.000	10.242	0.000	17.385	0.000
Housing	8.65	0.000	18.176	0.000	31.640	0.000
Health	9.14	0.000	18.027	0.000	30.920	0.000
Access to healthcare system	5.75	0.000	11.244	0.000	19.507	0.000
Social relations	4.84	0.000	10.246	0.000	17.656	0.000
N (%)	10,644 (56.1%)		7,290 (38.4%)		428 (2.3%)	

Goodness of fit: Cox and Snell R-squared: .810; Nagelkerke R-squared: .975; McFadden R-squared: .936

Likelihood ratio: 2,156.57

Source: The authors based on the results.

Table 7. Results of the classification (confusion matrix)

	Classification				
	Predicted				
Observed	Low hardship	Moderate hardship	High hardship	Very high hardship	Percent correct
Low hardship	567	39	0	0	93.6%
Moderate hardship	35	10431	178	0	98%
High hardship	0	189	7092	9	97.3 %
Very high hardship	0	0	12	416	97.2 %
Overall percentage	3.2%	56.2%	38.4%	2.2%	97.6 %

Source: The authors.

levels to economic, housing, and health aspects, although with different intensity and order. First, the causes that explain the change from moderate hardship – which affects 56.2% of the population analyzed – to low hardship correspond to health issues, with a value of 9.14, followed by housing issues (8.65), and economic issues (8.26). Second, the predictor variables that best explain the change to high hardship – which affects 38.4% of the study population – correspond to the economic dimension (18.857), the housing dimension (18.176), and health issues (18.027). Third, this order is maintained in the explanation of the differences from low to very high hardship, which affects 2.2% of the study population. As regards this last aspect, the beta results refer to the level of importance in the economic (36.643), housing (31.647), and health (30.920) variables.

6. Conclusions

The analyses indicate that the three objectives of this paper have been achieved. Specifically, they have shown 1) the existence of significant differences between the different levels of hardship; 2) the suitability of the variables included in the analysis; and 3) the high level of explanatory and predictive validity of the variables introduced in the assessment and diagnostic tool.

The first objective of the study was fulfilled and serves to establish recommendations according to the median levels of hardship in the affected life domains (see the Appendix). Based on the results of the analysis, four types or levels of hardship can be identified:

1) Very low probability of social hardship. The most relevant types of deprivation correspond to the economic and education domains. Consequently, intervention in these domains should be prioritized, with particular attention to hardship in terms of income, lack of assets, level of education, employment qualifications, and training skills. Additionally, preventive social intervention is needed in the relational domain as hardship was also found for the indicators related to support networks and social engagement.

2) Low likelihood of social hardship. The greatest hardship corresponds to the economic and employment domains. Thus, priority should be given to intervention in these two domains. However, an increase in hardship affects variables belonging to both domains, together with others related to training and social relations. Thus, interventions in this level of hardship should address both the socio-employment domain, including income and employment, and other interventions of a preventive nature relating to the socio-employment domain in the area of training, and the relational domain. In the relational domain, issues related to coexistence and social engagement should be addressed.
3) High likelihood of social hardship. At this level, deprivation mostly affects the income and employment domains. However, the domains that show the greatest increase in hardship correspond to health and housing issues. Thus, the preferential intervention in this group should focus on comprehensive solutions that combine intervention in these domains, although an increase in other hardships corresponding to the economic, employment, and relational domains can also be observed. These needs are mainly related to unemployment, economic forecasts, lack of support networks, and the seriousness of family relationship issues.
4) Very high likelihood of social hardship. At this level, hardship affects variables related to the six life domains. The variables with the greatest increase correspond to the health, education, housing, income, and relational domains. As in the previous group, a comprehensive intervention strategy that combines all the above aspects should be implemented. In short, there is an increase in hardship, except for the employment domain, which already reached its highest value at previous levels of hardship.

In accordance with objectives 2 and 3, PCA and multinomial regression analysis justify the life domains used and explain their importance according to level of hardship. The results indicate three relevant aspects: 1) all the resulting factors are significant in predicting levels of hardship; 2) the intensification of hardship, 3) the identification of critical thresholds as the different levels of hardship increase. Finally, a change in the order of the factors was observed and, therefore, different recommendations could be established according to the level of hardship and in line with the study results.

1) The variables corresponding to the health and housing domains explain the change in the lower severity levels and should be a priority for prevention.
2) The variables associated with the economic, housing, and health domains explain the change in levels of hardship in both the intermediate and higher levels of hardship. In this regard, income does not show the highest increases, but it does explain the worsening of hardship situations and should be given priority. The importance of investing in housing and social and health policies to reverse the most difficult situations is also evident.

3) Lastly, the employment, access to the healthcare system, relational, and education domains are significant in the explanations irrespective of the level of severity.

The systematic and continuous availability of information through case records opens up new possibilities for social diagnosis and social policy design.

As regards social services diagnoses, the analyses justify integrated social interventions that consider various life domains at different levels of hardship (Askin et al., 2011; Minas, 2014; 2016). In short, the results underline the importance of combining aspects relating to socio-labor and training intervention with other aspects of a health, social and housing nature to promote the transition from "active inclusion to inclusive activation" (Zalakain, 2020). By using the four levels of hardship defined in the SiSo tool, the differences between them were determined and the values according to level of hardship were quantified. The results of this study are useful insofar as they enable segmenting the population served by social services according to level of hardship and determine the degree to which these variables influence processes of social exclusion.

This study opens new avenues for research on the operationalization of the concept of exclusion, weighting criteria, and the social intervention process itself, as well as in-depth analyses of indicators and their impact on social inclusion processes. In this regard, in future research it would be of interest to replicate the multinomial analysis using the original indicators with a view to guiding social intervention processes.

This study has shown that it is possible to generate databases from primary care social services data that can be put at the service of knowledge for social intervention and social policies. The potential of big data lies in the organization of data records and the analysis of large databases to deliver more accurate deliberations and decision making (Gillingham & Graham, 2017). Data collection also ensures more accurate assessments and is therefore key to improving social care. The implementation of the SiSo tool to diagnose cases achieved optimal results in both explaining and predicting cases. These results have implications for the design and evaluation of primary care social services policies (Duque, 2014) by facilitating appropriate segmentation and allocation of resources according to users' level of hardship (Pereñiguez, 2012). This aspect is even more important in a context of limited social spending on social inclusion policies and high rates of poverty and social exclusion.

Project data

This study has been conducted in the framework of the agreement between the Department of Social Welfare at the Regional Government of Castilla-La Mancha and the University of La Rioja for the management of inclusion projects in accordance with the provisions of Order 12/2017 of 2 February of the Department of Social Welfare of Castilla-La Mancha. The project was made

possible through competitive annual calls in 2017, 2018, 2019, and 2020. It is co-funded by the regional government and the EU European Social Fund.

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Appendix

Table 8. Economic domain according to social status variables

		I		II		III		IV		Total		Chi d.f. p value
		%	Median	%	Median	%	Median	%	Median	%	Median	
Level of income % of median disposable income per equivalent unit in the last 12 months	> 100%	8.4		0.6		0.2		0		0.7		3065.704 9 00.000
	60 to 100%	26.1		4.4		1.1		0		3.8		
	30 to 60%	54.5		35.9		16		6.3		28.2		
	< 30%	11.1		59.1		82.7		93.7		67.4		
Source of income	From employment or contributory benefits	90.1		32.5		8.2		1.2		24.3		4007.742 9 0.000
	Informal economy, non-recurring or family benefits	3.8		11.2		10.5		7		10.6		
	Non-contributory benefits	5.6		35.9		32.4		17.1		33.2		
	No or marginal income	0.5		20.4		48.8		74.8		31.9		
Income forecast	> 1 year	78.2		28.5		14.7		6.1		24.3		3263.020 9 0.000
	7 to 12 months	13.7		10.8		4		1.6		8.1		
	3 to 6 months	6.8		27.2		15.1		6.1		21.4		
	No income or less than three months	1.3		33.5		66.2		86.2		46.2		
Material lack of AROPE items	No deprivation	28.4		3.3		0.4		0		2.9		6627.710 9 0.000
	Less than 4 items	58.9		42.2		15.1		0.9		31.4		
	4-6 items	12.7		52.5		67.7		20.3		56.4		
	7 or more items	0.00		2		16.8		78.7		9.3		

Source: The authors. Note: I. Low hardship; II. Moderate hardship; III. High hardship; IV. Very high hardship

Table 9. Employment domain according to social status variables

		I		II		III		IV		Totol		Chi d.f.
		%	Median	%	Median	%	Median	%	Median	%	Median	P value
Employment situation	No employment issues	66.5		9.1		1.6		0		7.8		6005.371
	Unstable employment or underemployment	27.1		33.5		11		2.6		24		9 0.000
	Irregular employment	5.3		31.1		26.8		11.2		28.2		
	Unemployment	1.2		26.3		60.6		86.2		40		
Employment intensity.	All year	51.3		5.2		0.3		0.2		4.7		5433.376
Households in which members of working age are employed.	7 to 11 months	24.1		7		1		0		5.1		9
	3 to 6 months	16.8		31.9		14.5		3		24.1		0.000
	< 3 months	7.8		55.9		84.2		96.7		66.2		
Employment prospects	> 1 year	69		11.2		2.5		2.1		9.5		4407.056
	7 to 12 months	15.8		6.7		0.8		0		4.6		9
	3 to 6 months	8.6		16.7		6.5		1.4		12.1		0.000
	< 3 months	6.6		65.5		90.3		96.5		73.8		

Source: The authors. Note: I. Low hardship; II. Moderate hardship; III. High hardship; IV. Very high hardship.

Table 10. Education domain according to social status variables

		I		II		III		IV		Total		Chi d.f.
		%	Median	%	Median	%	Median	%	Median	%	Median	p value
Level of education	Post-compulsory	20.3		8.5		2.9		0.9		6.5		1454.2
	Compulsory	26.9		15.7		7.4		4.4		12.6		9
	Primary	45.2		55.5		53.1		37.6		53.8		0.000
	No studies	7.6		20.3		36.7		57		27		
Employment qualifications	Updated	20.1		3.4		0.7		0		2.8		2607.9
	Experience and training	29.7		15.9		5.5		0.9		12		9 0.000
	Experience without qualification	43.4		58.2		47.8		26.9		53		
	Unqualified	6.8		22.6		46		72.2		32.2		
Employment search skills	Active search	59.4		17.8		2.6		0.5		12.9		4237.5
	In process	20		24.7		9.9		1.2		18.4		9
	Sporadic search	15		41.6		45.5		20.3		41.8		0.000
	Abandoned employment search	5.6		15.8		41.9		78		26.9		
Other skills	Skills in all areas	43.9		13.6		2.7		0.5		10.1		3229.7
	Lacking one	38.4		36.3		21.1		4.9		29.8		9
	Lacking two	15.2		43		54.1		37.9		46.3		0.000
	Lacking three	2.5		7.1		22		54.9		13.7		

Source: The authors. Note: I. Low hardship; II. Moderate hardship; III. High hardship; IV. Very high hardship.

Table 11. Housing domain according to social status variables

		I		II		III		IV		Total		Chi d.f. p value
		%	Median	%	Median	%	Median	%	Median	%	Median	
Housing tenure	Guaranteed housing	93.6		77.2		46.1		5.1		64.1		4409.379
	Shared or sublet	2.1		8.1		11.2		5.4		9.1		9
	Difficulties of access or permanence	3.5		11.3		25.3		11.9		16.5		0.000
	No or inadequate housing	0.8		3.4		17.4		77.6		10.3		
Housing conditions	Adequate	91.9		62.7		26.7		1.4		48.4		6768.541
	Some deficiencies	7.3		26.8		33.5		3.5		28.2		9
	Quite a few deficiencies	0.8		9.7		29.4		22.7		17.3		0.000
	Lack of equipment	0.0		0.8		10.4		72.4		6.1		
Housing accessibility	No barriers	71.6		57		39.7		20.8		50		3098.736
	Barriers that do not affect access	26.1		38.7		48.3		28.0		41.7		9
	Barriers that limit access	1.7		3.9		10.2		22.2		6.6		0.000
	Barriers that impede access	0.7		0.4		1.8		29.0		1.6		
Location environment	Ample supply	62.4		54.3		36.6		13.6		46.8		4278.090
	Low supply	35.8		38.2		42.4		25.2		39.4		9
	Disadvantaged environment	1.7		7.5		19.2		27.1		12.2		0.000
	Illegal settlements	0.2		0.1		1.8		34.1		1.5		

Source: The authors. Note: I. Low hardship; II. Moderate hardship; III. High hardship; IV. Very high hardship.

Table 12. Health domain according to social status variables

		I		II		III		IV		Total		Chi d.f. p value
		%	Median	%	Median	%	Median	%	Median	%	Median	
Access to healthcare system	Appropriate use	98.8		91.8		62.8		17.3		79.2		3446.197
	Sporadic use	0.7		2.9		14.6		26.4		7.9		9
	Inappropriate use	0.3		3.3		15.6		31.1		8.6		0.000
	Unsystematic use	0.2		2.0		7.0		25.2		4.4		
Health status	Good status	70.0		58.1		30.4		6.5		46.7		2713.977
	Independent living	24.1		26.0		29.1		18.7		26.9		9
	Quite difficult	4.6		12.7		30.6		39.0		19.9		0.000
	Very difficult	1.3		3.2		9.9		35.7		6.5		
Burden of care	No burden	81.5		65.8		35.8		10.3		53.5		2879.727
	Some overburden	13.5		16.4		19.6		8.9		17.4		9
	Quite a lot of overburden	3.5		10.9		23.1		22.9		15.6		0.000
	High overburden	1.5		6.9		21.5		57.9		13.5		
Difficulty in following treatment	No difficulty	87.8		76.6		45.0		9.6		63.3		3939.226
	Professional supervision needed	11.9		20.3		36.3		23.8		26.3		9
	Does not follow treatment	0.3		2.1		13.1		36.2		7		0.000
	Does not follow treatment for economic reasons	0.0		1.0		5.6		30.4		3.4		
Health habits	Healthy habits	93.2		75.7		34		2.8		58.6		5439.599
	Neglect of self-care	6.6		22.0		48.7		32.5		32		9
	No habits	0.0		1.5		11.1		29.7		5.8		0.000
	Serious health issues	0.2		0.8		6.2		35.0		3.6		

Source: The authors. Note: I. Low hardship; II. Moderate hardship; III. High hardship; IV. Very high hardship.

Table 13. Relational domain according to social status variables

		I		II		III		IV		Total		Chi d.f. p value
		%	Median	%	Median	%	Median	%	Median	%	Median	
Family relationships	Positive family relationships	72.8		47.8		22.5		3.3		37.8		2314.057 9
	Fragile family relationships	22.6		37.9		45.7		28.5		40.2		0.000
	Conflictive family relationships	3.5		11.2		26.5		55.8		17.8		
	Family violence	1.2		3.1		5.3		12.4		4.1		
Social coexistence	Positive relationships	72.4		44.5		16.9		1.2		33.8		3619.895
	Fragile relationships	26.6		53.2		70.7		48.4		59		9
	Conflictive relationships	1.0		2.1		11		40		6.4		0.000
	Community violence	0.0		0.2		1.3		10.5		0.8		
Support network	Adequate support	49.50		20.60		5.7		0.2		15.3		2796.044
	Lack of support	41.10		47.10		37.1		9.8		42.2		9
	Insufficient support	8.40		26.30		42.8		43.2		32.4		0.000
	No support	1.00		6.1		14.5		46.7		10		
Social engagement	Active engagement	19.30		5.60		0.6		0		4		2702.554
	Regular engagement	38.80		25.2		9.3		0.2		18.9		9
	Occasional engagement	36.00		54.6		55.5		30.8		53.8		0.000
	No engagement	5.90		14.7		34.6		68.9		23.3		
Asocial behavior	No history	88.40		77.3		53.6		18.5		67.2		2704.407
	Occasional	10.70		19.3		32.2		32		24.3		9
	Recurrent	0.70		2.6		10		22.4		5.8		0.000
	Continuous	0.20		0.9		4.1		27.1		2.7		

Source: The authors. Note: I. Low hardship; II. Moderate hardship; III. High hardship; IV. Very high hardship.