ORIGINAL RESEARCH

The Multidimensional Conception of Social Exclusion and the Aggregation Dilemma: A Solution Proposal Based on Multiple Correspondence Analysis

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Abstract

The main objective of the article is twofold. On the one hand, it aims to offer a critical analysis of the different operationalizations of the concept of social exclusion at the international level, including reflection on widely used methods such as the "At risk of poverty or social exclusion" rate. On the other hand, it offers an empirically tested proposal of indicator aggregation for the measurement of social exclusion. The debate regarding the measurement of social exclusion has been widely addressed, but there are hardly any proposals that test different systems of indicator aggregation. The multiple correspondence analysis allows the implementation of a new approach for measuring the weights of the indicators, based on the distance to the integration point, which is understood as the absence of problems. The proposed new system shows an important potential to be extrapolated to the comparative measurement of social exclusion, also allowing the comparison of different social groups. The empirical reference used for the analysis is the Survey on Social Needs and Social Integration of the FOESSA Foundation for Spain 2018.

Keywords Social exclusion concept · Social exclusion measurement · Indicator aggregation · Multiple correspondence analysis

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1 Introduction

The concept of social exclusion has a French origin, both in the academic field and in social movements, which spoke of the Fourth World.[1] With the incorporation of the term into the glossary of the European Commission, from the II Program to Combat Poverty at the end of the 80′s onwards (Hiernaux, 1989), its use extends throughout Europe as an alternative to a purely economic and static conception of poverty studies. Since then, there has been a fairly broad consensus regarding the need to contemplate a multidimensional and dynamic perspective of social exclusion processes. The new conception of these processes not only opened an interesting agenda for social research, but also accounted for the lines of profound transformation of society itself since the last decades of the last century (Brugué et al., 2002; Room, 1995), with implications for the orientation of social policies as well.

The theoretical developments have been broad, and different approaches for their measurement have been developed, especially linked to national contexts, but also to international institutions such as the European Commission. The fundamental debate here has been the selection of the necessary indicators for approaching a multidimensional phenomenon like social exclusion. Less frequent is the literature that addresses issues such as the aggregation of the different dimensions of social exclusion and the indicators selected to account for them from a critical and empirically-proven perspective.

The most frequent approaches have focused on measuring an extended concept of poverty. Alkire and Foster (2011) point out two fundamental ways of aggregation of dimensions, with the objective of measuring what they call multidimensional poverty. The first of these is the so-called intersectional approach, which considers that a person is in a situation of multidimensional poverty when he or she manifests difficulties in all the considered dimensions. However, the authors criticize these methods as limited by their inability to capture situations of multidimensional poverty due to the restrictiveness of their requirements. A second approach is what the authors call union methods of identification, which consider people as multidimensional poor if difficulties in at least one of the contemplated dimensions are shown. This type of measurement, however, does not allow for a large set of dimensions, as this would result in considering a large part of the population as multidimensional/excluded poor (Alkire & Foster, 2011).

Starting from the limitations of the two approaches mentioned above (union/intersectional), the debate is thus opened towards a third type of intermediate classifications. The discussion then focuses on how many of the indicators should be taken as a limit and what weights to attach to them in the aggregation. This is especially relevant if one considers that, as Atkinson et al. (2002) point out, granting the same weight to different dimensions makes sense only when they have a level of importance that is "while not necessarily exactly equal, not grossly different".

In the absence of proven evidence on the effects of different decisions for the aggregation of specific indicators of social exclusion, which must necessarily articulate dimensions such as employment, consumption and living conditions, and political and social rights, as well as social and family relationships, the article firstly addresses different proposals for an empirical approach to the issue. Secondly, it analyzes the contribution of a complex

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[1] The appearance of the term on the scene of scientific-technical debates in the mid-70 s, however, was more due to chance than to a theoretical reflection on the matter. It was the editor of René Lenoir's book, *Les exclus, a français sur dix*, who decided on the suitability of this title, even though it was hardly described in these terms in the book. (Lenoir, 1974).

system of measurement of social exclusion based on the conjunction of 35 indicators that has been implemented by the FOESSA Foundation in Spain. Thirdly, the article proposes a new method of indicators aggregation based on the distance to full integration, which is understood as the absence of problems. Multiple Correspondence Analysis (MCA) is used for this purpose. These are the main objectives of the article.

2 Unidimensional Poverty, Multidimensional Social Exclusion

The reflection on the proposals for measuring social exclusion must necessarily start from perspectives on economic poverty, which have made a significant effort to incorporate dimensions that are not strictly monetary, such as the deprivation of certain material goods. Indexes capable of measuring the intensity of poverty have also been constructed (poverty gap, for example). In this way, poverty rates have become more sensitive to changes over time, even when they are not of great magnitude (Foster et al., 1984; Nolan & Whelan, 1996; Sen, 1995). However, these methodological proposals have always remained in an exclusively economic orientation, consistent, on the other hand, with more classical conceptions of poverty, opposed to wealth.

Other authors have also developed a wider concept of poverty than the strictly economic (market) approach. They have proposed talking about multidimensional poverty, incorporating other indicators. The methodological proposal put forth by Alkire and Foster has a special interest in the analysis of multidimensional poverty. It overcomes the limitations of the headcount method and focuses on the measure of "breadth, depth and severity" of multidimensional poverty, applying FTG methodology (Foster el al., 1984). It allows the analysis to be broken down into subgroups and is sensitive to the worsening or improvement of each individual (and therefore also of the subgroups) in each of the indicators. It is also sensitive to the distribution of deprivation among the poor. The application is maintained in a limited number of indicators (income, perceived health, health insurance and years of schooling in the case of the US; expenditure, muscle mass and years of schooling in the case of Indonesia), stating the need to perform differentiated analyses in countries of very different levels of human development (Alkire & Foster, 2011).

Beyond the developments on the multidimensionality of poverty, at the international level, an operationalization of the concept of social exclusion that includes all its multidimensionality and its dynamic conception as theoretically raised has not been applied. In the preceding analyses, based on the concept of multidimensional poverty, basic aspects as social and family relations, "social ties" (Paugam, 1998, 2007) or, in negative terms, "disaffiliation" (Castel, 1991, 1997) have not been included. Some analyses, show that one of the dimensions that most relates to economic poverty is precisely the exclusion of common social activities (Levitas, 2006). The relevance of the concept of citizenship also goes unacknowledged, either in its dimension of political and community participation, or in terms of the effective recognition of social and economic rights (Lister, 1990, 2007), upholding classic contributions (Marshall, 1949, 1977; Mill, 1951).

The concept of social exclusion has led to the development of more clearly multidimensional proposals, gathering the contributions of theoretical literature in this regard. The recommendations for this type of analysis made from the British experience stand out in the elaboration of a matrix for the construction of indicators on social exclusion that includes three main domains, with three subdomains each: resources (economic-material, access to public and private services, and social resources), participation (economic,

social, educational-cultural, and civic-political) and quality of life (health, environment, and crime),[2] also taking into account different situations and forms of social participation throughout the life cycle[3] (Levitas, 2006; Levitas et al., 2007). It seems pertinent therefore to look for new methodological developments that allow us to adequately measure social exclusion by observing its evolution, its transformations, and the differences in intensity between some situations and others, between some groups and others.

3 The Limits of the AROPE (At risk of Poverty or Social Exclusion) Rate to Account for Social Exclusion

In this international field, the European Commission aimed to correct these limitations in its technical-political documents, especially when presenting its strategy of social inclusion in Europe in 2013, which aimed to extend the achievement of not only living and welfare conditions that are considered normal in the society where they exist, but also to achieve full participation in economic, social and cultural life, emphasizing the importance of effective access to services (Commission, 2013). Leaving political and social issues, its operationalization in the AROPE rate was limited for the following reasons:

(a) This rate is still limited to economic dimensions (employment, income and material deprivation), without considering other dimensions that were already included even in multidimensional poverty measurements. The number of indicators is very limited (only three, although material deprivation is based on 9 items) so it can hardly account for the multidimensionality of social exclusion, which was what justified it in the Commission's methodological documents. Secondly, it does not consider the concurrence of several indicators as an approximation to the accumulation of difficulties and therefore to situations of greater severity of social exclusion.

(b) It is a mixture of very different indicators, some with a very wide incidence (monetary poverty) and others with minimal incidence in many European territories (deprivation of certain comforts). In the Spanish case, for example, income poverty identifies 82% of the total AROPE population in the 2018 European Union Statistics on Income and Living Conditions.

(c) It merges structural indicators, which have to do with profound characteristics of each society and, therefore, evolve slowly, with others more sensitive to cyclical changes. According to data from the National Statistics Institute of Spain, the at risk of poverty rate, which is actually an indicator of relative inequality and thus extremely conditioned by the evolution of general wealth, increased by only 11% over the past economic crisis, between 2008 and 2014, and even fell by 0.4 percentage points in 2013 compared to the previous year. In contrast, the low work intensity in households multiplied by 2.6 in the same period.

(d) Some indicators, such as the poverty rate, regard all households as potentially affected, while others, such as the low work intensity, apply only to households with at least one active person.

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[2] Bristol Social Exclusion Matrix (B-SEM).

[3] Bristol Social Exclusion Matrix (B-SEM).

(e)	The AROPE rate mixes different years in the measurement, since the incomes refer to the year prior to the survey and the rest of indicators to the time the survey is carried out. It is difficult to assess the dynamics of the phenomenon of exclusion with this temporal laxity. It is not known to which year the picture corresponds.

In conclusion, the AROPE rate was a compromise solution at the time, which has now become clearly unsatisfactory as an approximation to the processes of exclusion, in the light of available knowledge. With a notable lack of consistency with the concept of exclusion set out in the EU inclusion policy documents (Commission, 2013), what and when it is measured is not clear but, in any case, it is not an adequate measure of social exclusion. The approval in 2001 by the Social Protection Commission of a series of harmonized indicators of social exclusion, 10 primary and 8 secondary, is a step forward, and constitutes a very necessary complement to the AROPE rate (EU-SPC, 2001). However, since it does not pose the possibility of aggregation, it offers a series of partial, one-dimensional approaches to exclusion, not measuring it as a whole.

4 Some Advancements at the National Level

Considering these debates, some particularly interesting works have been carried out at the national level, an exercise that has undoubtedly facilitated the selection of appropriate indicators in each case, but that deprives us of an international comparative perspective.

The Government of Chile, through the Ministry of Social Development and the National Institute of Statistics, has developed a measurement system of what they call expanded multidimensional poverty. Based on the line of work and the methodological proposals of Alkire and Foster that were reviewed earlier, and using the national CASEN survey,[4] they build an index based on indicators on education, health, work and social security, housing and environment, and networks and social cohesion, with 3 indicators in each of the dimensions, although with a very different level of complexity in its construction in some cases. Indicators of income or economic capacity of households are not introduced. The last dimension, of networks and social cohesion, which is introduced for 2016 (with data from the previous year) for the "enlarged" perspective, brings us back precisely to the axis of social relations that was absent in other works: to have someone that can provide support to the household, participate in civic, union or professional organizations, experience some kind of discriminatory treatment or have lived or witnessed drug trafficking or gun use. Regarding the weights, they decided to maintain the same weight for the first four dimensions (and therefore of the corresponding indicators), equal to 22.5%, but the new dimension of networks and social cohesion weighs less, only 10%. The greater importance that these dimensions could have in public policies assessed by the authors may not correspond directly to the dynamics that the processes of social exclusion (or of extended multidimensional poverty) really have in society. Also linked to the case of Chile, Gallardo sets a proposal to measure the vulnerability to multidimensional poverty related to different social characteristics capturing the "diversity of the existing risk among the different welfare dimensions" (Gallardo, 2019).

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[4] National Socioeconomic Characterization Survey, directed by the Ministry of Social Development, with the technical support of the Poverty and Human Development Initiative of the University of Oxford (OPHI).

In the British experience, the contributions of Ruth Levitas should be highlighted when conceptually differentiating poverty and social exclusion and subsequently analyzing their interrelations (Levitas, 2006). Using the United Kingdom Poverty and Social Exclusion Survey, she raises the possibilities it offers to incorporate indicators of exclusion from the labor market, services, social relations (common social activities, social isolation, social support) and civic participation. This approach acknowledges the accumulation of indicators as an approximation to the intensity of social exclusion, with 76% of the population affected by any of them and with 10% affected by 5 or more of the total indicators. Based on this experience, she concludes that "indicators of social inclusion need to routinely include some that directly address the fabric of social life", beyond those of poverty and employment present in official indicators, both in the EU and the UK. In the same way, she recommends continuing the work of refining and developing social exclusion indicators that had been introduced in this survey.

In the Spanish scenario, the exercises that have been carried out in a multidimensional approach to social exclusion are diverse, both from qualitative and quantitative perspectives (García Serrano et al., 2000; Laparra et al., 1996; Sarasa & Sales, 2007; Subirats & Gomà, 2003). Based on these diverse experiences, the FOESSA Foundation promoted a process of theoretical and methodological debate on the best way to approach the analysis and measurement of exclusion processes from a fully multidimensional perspective. The research groups that had approached the empirical analysis of social exclusion in the Spanish context participated in it, arriving at a consensus proposal, both on the theoretical approach to social exclusion processes, and on their operationalization in a system of indicators. The details of the process can be consulted in Laparra et al. (2007).

In this work, social exclusion is understood as a phenomenon of a structural nature that has to do with characteristics and transformations in three spheres that affect the capacity of integration of society: in the economic sphere, in social relations, and in the political space, especially of the effective protection of social rights. Its multidimensional nature indicates the difficulties or barriers that these processes generate for people and households in these three main areas: the economic domain measuring participation in economic life (either in the production of wealth, or in the access to its distribution), the political domain related to citizenship rights, both to political participation and to social rights, and the domain of social relations that produces problems of social isolation or perverse interpersonal relationships of a conflictive or violent nature. Its procedural nature (exclusion as a process) indicates a dynamic of progressive distancing from a certain model of social integration in which different stages can be distinguished according to intensity (from precariousness or vulnerability to the most extreme social exclusion), which is expressed in the accumulation of gaps or barriers, as well as in the limitation of opportunities in different fields.

5 The Methodological Base for a New Proposal: The Synthetic Index of Social Exclusion (SISE) of the FOESSA Foundation

This article focusses on the FOESSA system of indicators, based on the already presented theoretical conception, which was explained in detail when it was firstly applied (Laparra & Pérez, 2008). This is a system of 35 binary indicators (see Table 1 and 2) linked to three fundamental domains (economic, political and social), with a total of 8 dimensions.

Table 1 Indicators of social exclusion, dimensions and domains

Domains	Dimensions	Indicators	Number of indicators
Economic domain	d1. Participation in employment	1 to 6	6
	d2. Participation in consumption	7 and 8	2
Political domain	d3. Political participation	9 and 10	2
	d4. Access to education	11 to 13	3
	d5. Access to housing	14 to 21	8
	d6. Access to health	22 to 27	6
Social domain	d7. Social conflict	28 to 32	5
	d8. Social isolation	33 to 35	3

The main issues developed in international literature in relation to theoretical reflections on social exclusion are covered in this way. The proposed system considers "restrictive" indicators in its definition, designed to detect situations that in themselves pose serious difficulties in people's lives. However, even accepting this premise, it is also understood that the impact of the situations detected by the indicators in households may be different. Unlike other analyses reviewed before, in this case, the survey was designed on the bases of the theoretical approaches, trying to adequately account for the multidimensionality of social exclusion, as previously defined.

The temporal reference of the indicators is not homogeneous here either. In general, the vast majority of indicators refer to the time the survey was conducted. However, in the case of income, in the same way as in the AROPE rate from the EU-SILC, the reference is the year prior to the survey (total income in a full year). Other indicators that have to do with the identification of situations that prolong their effects and stigmatize people for a certain time (addictions, domestic violence …), raise a more extensive 10-year time reference, with the aim of improving their detection capacity. The possibility of homogenizing this temporal reference should also be considered here, trying not to lose that detection capacity, although the incidence of these indicators is clearly lower than in AROPE, within a system of 35 indicators in total in FOESSA, compared to 3 in AROPE.

In the FOESSA system, diverging from other exercises analyzed here, the question of what weight to give to each one of the indicators was specifically addressed. The weight of each indicator is calculated as the inverse of the percentage $(1/f(x))$, divided by the number of indicators of each dimension (d1 = 6; d2 = 2; d3 = 2; d4 = 3; d5 = 8; d6 = 6; d7 = 5 and d8 = 3). It is thus understood that, the stricter the threshold in an indicator, the lower the frequency of this indicator and, therefore, the greater the severity of the observed problem or deficiency.

The aggregation of SISE was constructed using the total score in the 35 indicators with these weights in two steps. Firstly aggregating the group of indicators for each one of the 8 dimensions (i.e. the score of the first dimension, employment, is the sum of the weighted scores of indicators 1 to 6) and these dimensions later (i.e. the total score, SISE, is the average score of the 8 dimensions). With this normalization, the minimum score for an individual was 0 (full integration). The average for the whole of society was equal to 1 (the average of problems), and the maximum score is variable, depending on the accumulation of indicators in the worst case of maximum exclusion. The minimum is always 0 but the maximum depends on the distribution. If an exercise using the 2018 Social Integration and

Social Needs Survey from the FOESSA Foundation as a base for the aggregation method described earlier is carried out, the maximum score for the SISE index is 32. The average tends towards 1 and the standard deviation is 2.09. The weights of the indicators calculated with this method can be seen in Table 2. Obviously, this topic is open for debate, but it is nonetheless a more nuanced solution than to simply assume that all the observed problems are equally important. As seen in Fig. 1, other weighting possibilities based on the MCA result in less dispersion.

From here, the question of classifying households and people with different intensities of social exclusion arises. Those households that do not have any indicators and whose SISE is equal to 0 are considered in a situation of full integration. Starting from the afore-mentioned premise that the issues detected by the indicators are already serious, those households with some indicator, and that have a SISE around the average ($0 < SISE < 2$), are considered in situations where there is a problem, but which are statistically normal and therefore do not deviate too much from the integration model of society as a whole. They are then cataloged as households in situations of precarious integration. The house-holds furthest from the average ($SISE > 2$), with twice as many problems, are cataloged in situations of social exclusion. Those who have a SISE greater than double the average of the society ($2 < SISE < 4$) are placed in moderate exclusion. Those whose SISE dou-bles that corresponding to households in situations of moderate social exclusion ($SISE > 4$) are placed in severe exclusion. In the same way as the monetary poverty thresholds, the classification in these four groups is still arbitrary. This should lead to careful considera-tion, using the SISE (without intervals) as relevant information in the comparison between individuals and groups and as a visualization of social spaces and distances in society as a whole. Beyond the arbitrariness of any decision regarding the establishment of intervals, the contrast of the data allows us to see the contribution of this multidimensional concep-tion of social exclusion and its corresponding operationalization, with respect to the typi-cally economic-monetary conception of income-based poverty.

On the other hand, and as with the measurement of monetary poverty, the debate regarding the "anchoring of thresholds" is open. For a single-year synchronous analysis, it is common to take the year when the survey was conducted as a reference. However, when we intend to investigate the changes in social situations over time, the possibility of using the same weighting system throughout the analyzed series opens up, predictably the one from the year of the beginning of the series being compared. A relevant issue here is that, possibly, the transformation of the social integration model (the expectations of con-sumption, social support or protection that the population has in its collective unconscious) does not evolve at the same pace as the change in real living conditions, at least when they worsen. In this regard, it may be justified to anchor the weighting to a given time.

As mentioned earlier, the SISE calculation considers indicators of very different types, which show very different behaviors. The exclusion calculation system has been applied to four FOESSA Surveys, for 2007, 2009, 2013 and 2018, thus allowing an assessment of the progress of social exclusion through time in Spain. Between 2007 and 2018, the behav-ior of the different indicators was very diverse. The frequencies of the indicators linked to the analysis in relation to the labor market, especially those related to unemployment, increased significantly as a consequence of the changes in the Spanish context, where the crisis moved immediately in a significant increase in unemployment rates of people and households. However, the indicators linked to social relations remained much more stable. It is evident that, in the Spanish case, family and interpersonal networks play a fundamental role in the prevention of social exclusion, an element that the system of indicators conveys. Given this evidence, in the last editions of the survey, the FOESSA Foundation decided to

propose a system of aggregation of the indicators anchored in the first year of the series. However, if we remember that the weight of the indicators in the SISE is determined by their frequency, the debate is set. The different behavior of the indicators suggests building a less volatile weighting system, one significantly less determined by changes in the frequencies of the indicators. This is what it will be proposed next, starting from the MCA and the calculation of the distance of each indicator with respect to the theoretical point of full integration.

6 Methodological Development: A New Aggregation Formula Starting from the Multiple Correspondence Analysis

The MCA analysis and the new weighting system for indicators have been applied to the FOESSA Survey 2018 on Social Integration and Social Needs. This survey is representative for the whole of Spain and every region, except for Ceuta and Melilla (46,7 Million inhabitants). With 11,655 households interviewed (29,953 people), the margin of error is ± 0,6%. (Fernández Maíllo, 2019).

The MCA is a factorial method designed for the analysis of several qualitative variables whose theoretical foundations and application can be studied in Lebart et al (1995), Beh and Lombardo (2014) and Greenacre (2017). In our case, we have 35 binary variables (system indicators) analyzed by MCA. Low frequency indicators (below 2% of YES responses) have been suppressed from the MCA not to distort the results. However, these variables have been projected into the MCA factors in order to study their behavior, receiving the name of illustrative variables. In addition, the exclusion variable (with four categories) was considered as illustrative, allowing the results of the MCA to be enriched. In order to not exceed the limit of this paper, the analysis of the absolute and relative contributions of the active categories to the factors have not been included since they did not provide relevant information regarding the coordinate graphs.

The first two factors of MCA extracted explain the 25.4% of the total inertia (equivalent to the total variance) of the active variables. The first factor explains 17.41% of the total inertia and the second, 7.99%. If the Benzecri correction is used, a more accurate assessment of the true explanatory power of both factors is obtained. Thus, considering this correction, the first factor accounts for 71.62% of the total inertia and the second for 8.90%. This result indicates that approximately 80.52% of the total information (inertia) contained in the analyzed indicators is explained in the 1, 2 plane (formed by the first two factors we have used in this analysis). The two factors selected in the MCA analysis maximize the inertia of the data table and explain a sufficient percentage of the information contained in the data. This analysis opens a path for further analysis. Bootstrap techniques or even other types of approximations could be used in the search for an optimal dimensionality from a statistical point of view. However, this goes beyond the objectives of this article.

Based on the modality factorial co-ordinates, factor 1 is an indicator of exclusion-inclusion, especially in aspects of employment and social rights. A higher positive score for a household in factor 1 is associated with greater inclusion, especially in employment and social rights. A higher negative score for a household in factor 1 is associated with greater exclusion, especially in employment, social rights and also in participation in the social product. Factor 2 is an indicator of opposition between exclusion due to aspects of employment and participation in the social product against exclusion due to aspects of social

rights and social conflict / harmony. A higher positive score for a household in factor 2 is associated with greater exclusion for employment and participation in the social product. The higher the negative score of a household in the factor, the greater the exclusion due to social rights or social conflicts / harmony.

The 1,2 plane allows, therefore, to interpret the positions of response modalities (YES/ NO) of the indicators, those of illustrative variables can be found and also the position of individuals, since a high percentage of original information is collected in the plane. The statistic units are individuals, but always associated to the characteristics of the household in which they live. The MCA analysis has been performed using SPAD software.

7 Results of MCA Analysis: Positioning Groups, Individuals and Indicators in the Social Space

Figure 2 shows a representation of Spanish society in terms of integration and exclusion. It represents individual's positions according to their coordinates in the two main MCA factors. Individuals are represented with a symbol according to the SISE category they belong to. If several individuals have the same coordinate, the point size increases proportionally. Concentration ellipses are also drawn for each SISE category. Each ellipse contains at least 80% of the individuals in its category, except full integration. All the individuals in this group have the same coordinate (big diamond). The procedural nature of social exclusion is represented in Fig. 2 in the form of distances between individuals, with the understanding that the greater distance from full integration point implies an intensification of the processes of exclusion. The image that it gives us is that of a model of precarious integration that corresponds quite well with Spanish society, in which the greatest distances occur in severe exclusion groups with respect to the aggregate of the majority population. There is no exact correspondence, but there is a fairly robust approximation with the SISE classification in the four exclusion groups. This, on one hand, makes it seem reasonable to keep it for descriptive analyses and the necessary dissemination of results. However, it reminds us that the established intervals are still arbitrary and that the SISE should also be used to compare situations.

The MCA allows us to position each of the indicators so that their greater or lesser association with social exclusion processes of different intensity is shown. The analysis, presented in Fig. 3, shows the existence of associations between indicators. First, in the upper left part of the Fig. 3, there are indicators linked to severe social exclusion, which preferentially capture situations of exclusion in employment and which are also related to situations of economic poverty (IND 7). The "yes" modality of IND 1 (households whose main breadwinner has been unemployed for a year or more), IND 4 (households without employed persons, nor contributory pensioners, nor on leave, nor with contributory unemployment benefits) and IND 6 (households with all active members unemployed) stands out here. This would support the need to incorporate these economic indicators in social exclusion analyses, which were left out of certain methodological proposals. However, the analysis seems to suggest that the configuration of the poverty indicator, established at 30% of the median income per unit of consumption detects very extreme positions. Therefore, it would be convenient to introduce an extended threshold (40% of the median equivalent income, for example, as the EUROSTAT does). Similarly, in the Spanish case, Autonomous Community thresholds, which are more closely related to income levels and prices in the local territories, can be used. This can be justified because of the decentralization of the
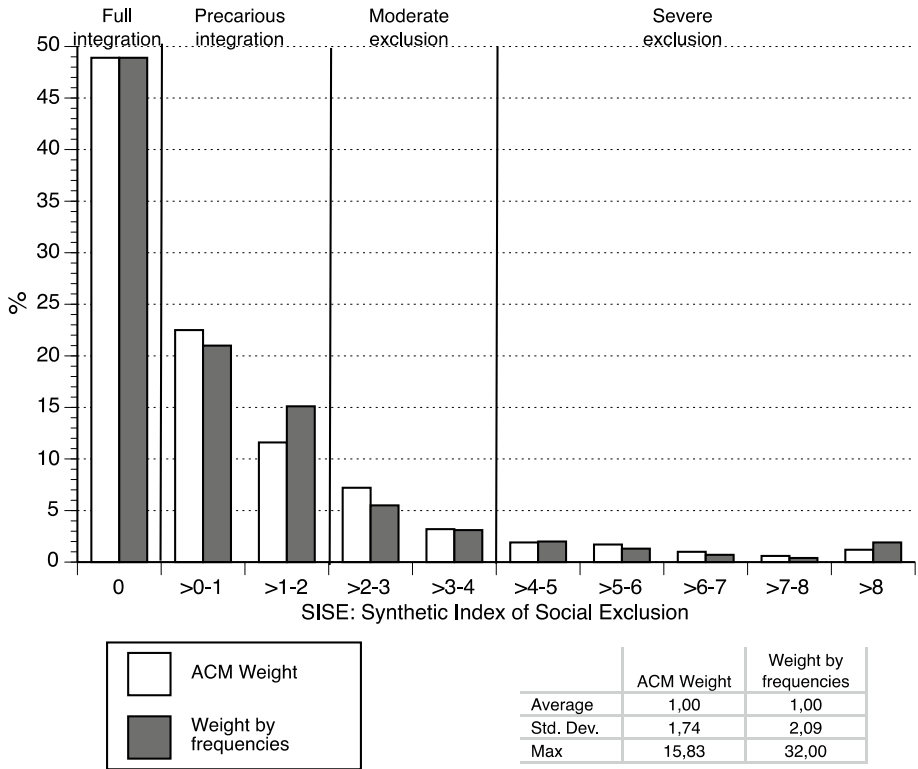
Fig.1 SISE with two methods of weighting indicators. Results for the Spanish population in 2018. *Source* Survey on Social Needs and Social Integration 2018. FOESSA Foundation

minimum income schemes in Spain, with a very high diversity on the protection they offer (Zugasti & Laparra, 2017).

In the lower left, there is a second group of indicators that capture difficulties in health and housing, also associated with severe social exclusion. In this quadrant, the "yes" modality of IND 23 (they have frequently gone hungry in the last 10 years or they go hungry now), IND 18 (precarious tenure), IND 21 (excessive housing expenses) and IND 27 (households that have stopped buying medicine, following treatments or diets due to economic problems) can be seen.

Moderate social exclusion situations appear associated with indicators linked to exclusion in housing that capture environmental problems (IND 19), not to housing itself. There is also an association between moderate social exclusion and indicators linked to difficulties in the relational axis, more specifically to family conflicts (IND 29 households with very bad, bad or rather bad relationships) and institutionalization (IND 35 households with people in institutions: psychiatric hospitals and facilities, drug addiction centers, child protection facilities, prisons, halfway and transient houses or women's shelters). Likewise, and far from the image present in the collective imagination that links irregular and exclusionary employment with severe social exclusion, it can be shown that indicators that capture jobs with very high levels of precariousness (IND 2 and 3) are associated with situations of moderate exclusion.

The indicators associated with precarious integration are few in numerical terms. Three of them are related fundamentally to the detection of problems among people living in households with people with disabilities, dependence, disease, and with elderly people. These are IND 24 (all adults with disabilities, chronic illness or serious health problems that generate limitations for daily life activities), IND 25 (households with dependent people who need help or care from other people to carry out the activities of daily living) and IND 33 (people without relationships at home and who do not have any support for situations of illness or difficulty). Since there is a clear association of these indicators with full social integration, it would be possible to propose their revision so that they could more persuasively account for real situations of social exclusion.

The distances between some indicators and others are very noticeable, much greater, for example, than those between different social groups identified using sociodemographic characteristics (Fig. 4). This underlines that the comparative importance of any deficiency or problem in a household is very different when explaining how the entire process of social integration, as a whole, functions. From this finding, any construction of this type of aggregate indexes that more or less explicitly assumes an equal or similar (and, in any case, not empirically endorsed) weight for all the indicators used should be revised. It is therefore necessary to look for some operational instrument that allows us to properly weigh the exclusion indicators. This is the solution that the MCA allows: to weight each of the indicators according to the distance that this analysis shows relative to the point of full social integration. The results, shown in the following section, are based on MCA analysis.

8 Results of the Measurement of Social Exclusion from the Calculation of Distances

The aggregation proposal is based on the calculation of Euclidean distances of "yes" modalities to the full integration point. This is the one that corresponds to population in which none of the problems have been detected, in which the value for all indicators is equal to 0, calculated from the MCA coordinates of each point in the plane of factors 1 and 2. Once the distances are calculated, the distribution is normalized so that the average of the SISE for the set of the population is equal to 1, obtaining the proportional value for each of the weights. Thus, if the initial average score using directly the Euclidean distance in the 2018 is 32,84, each indicator is finally weighted by the Euclidean distance, divided by 32,84. Here the relevance of each indicator is directly valued by the MCA, not considering the number of indicators of every dimension. The process followed and the results can be seen in Table 3.

The results of introducing this new weighting method based on the MCA, in general, mean a worsening of the general diagnosis on the incidence of social exclusion in Spain, from an estimate of 15% of households to a new one of 16.9%, not so much as a result of registering a greater incidence of the most serious forms, but because of the identification of a greater number of cases in situations of moderate exclusion.

In spite of this difference, the general image that it reflects is quite similar as a whole and thus, in a way, the new system, more rigorous and with a more robust statistical support, comes to legitimize the previous analyses as a solution always better than having considered all the indicators with the same weight. In Fig. 5 the differences in the weighing can be seen. The new system corrects some of the dysfunctions that appear with the previous system.

In addition, it is effective when comparing the situation of some social groups and others regarding the incidence of exclusion processes. This new calculation formula tells us that the situation of certain groups is worse. Social exclusion is intensified by 17.2 points among households with an unemployed person present, and severe social exclusion increases by 12.7 points for these households. The worst diagnosis of this social group has special relevance in the Spanish case because it is known that the economic crisis, in this context, was quickly translated into job destruction. The disadvantage of households whose main breadwinner is unemployed is also more clearly evidenced by the new system of aggregation.

Likewise, there is an increase in the rates of larger families with a more complex structure, such as polynuclear households or those with 5 or more members, which are in turn among the least covered by the benefits of Spanish minimum income schemes. The severe social exclusion among these types of households is now 19.5%, 5.2 points more than that corresponding to the previous system. Exclusion (by 6.1 points) and severe social exclusion (by 2.8 points) also increased among households with a foreigner, which already showed a situation of special fragility in the previous system, or among households in which there are children or young people. It is also relevant, due to its implications in terms of progress of the social model, the strong increase of 12.7 points in experiences of social exclusion among households supported by people under 29 years of age. That is, the new system reinforces the idea of the fragility of younger age groups in the Spanish context. This has implications in terms of loss of social capital. In regards to gender, the differences have also increased, with a higher incidence of exclusion calculated with the new system of aggregation in households headed by a woman.

In contrast, households in which the main breadwinner is employed show lower rates of severe social exclusion (2.7% vs. 5.7%). Although the loss of integration capacity traditionally offered by employment is an important debate nowadays, the new weighting reinforces the idea that employment is still a key mechanism for integration. Households with seniors present, who in turn have been designated as a social group that is one of the "survivors" or "least affected" by the last social crisis in Spain, show better outcomes, with less incidence of social exclusion. The appendix shows the results of applying both systems of aggregation for households (Table 4) and individuals (Table 5).

9 Conclusions

Throughout these pages we have shown, in the first place, the feasibility of applying an integrated system of social exclusion indicators broad enough to account for the various dimensions that this complex phenomenon presents in the available literature that have been reviewed. The use of a synthetic index, from which a classification can be constructed at different levels (4 in this example, from full integration to severe exclusion), is easily applicable in political and social debates. These results have direct implications for the evaluation of the Inclusion Strategy in Spain and for the social management of the previous crisis 2008–14. It would be very useful to continue with this methodology in order to measure the social impact of this new post-coronavirus crisis.

The FOESSA system, as evidenced, is likewise sufficiently sensitive to compare the situation of various social groups. It is also sensitive to changes over time, using in its last edition the same weights for indicators, implicitly assuming that, despite economic and social changes, the integration model of a society is maintained over certain time. It should

be stressed that according to the proposed method, the indicators weights are relative, they change depending on the structure of exclusion and they could be different over time and in dissimilar contexts. This is the reason for using the same weight for each indicator if we want to assess the evolution of social exclusion in a particular country during a period of time.

Far from assuming a redundant contribution, it articulates social exclusion in its fully multidimensional conception providing information that is relevant and complementary to what can be obtained from classical analyses of economic poverty. These are two strongly interrelated phenomena, but with important differences in terms of the groups affected by them. This differentiation also has practical implications when articulating income guarantee policies with social inclusion programs, an issue that is still very present in the political debate. The models based on the recognition of a double right, to both minimum income and social inclusion, would be more consistent from the start with the reality that these data reflect.

Secondly, an attempt has been made to provide an empirical evidence base, through the MCA, for a new system of aggregation of the indicators where the weight of each indicator is based on the distance it presents from the point of full integration and, therefore, with greater or lesser correspondence with different situations of exclusion. The proposed method, opens a possible path for progress in a debate rarely addressed in the academic literature, the aggregation systems of indicators that, so far, have not had an empirical endorsement that tests their operation or that allows to assess the consequences of the methodological decisions made in terms of social exclusion measurement. From here, the use of other factorial approaches (such as bootstrap techniques) can be considered in the search for optimal dimensionality.

The solution, frequently adopted in studies, of giving the same weight to all indicators shows obvious limitations when they interrelate situations or events of different relevance to the processes of social exclusion. However, both the indicators definition and the aggregation method described here are dependent on the characteristics of a particular country. So, an international comparison would need firstly a common definition of indicators which could be applicable to every country (i.e. European Member States), based on the international literature on social exclusion and contrasted with available information. Secondly the aggregation method (and the weight of indicators) should be analyzed assessing the difference of using a national reference (different indicator weights for each country) or a common reference (an European common weight). Moreover, as mentioned before, the selection of indicators is frequently constrained by the information available in surveys for other purposes. Access to open data that allows the analysis of social exclusion from a fully multidimensional conception should be encouraged. The limitations of the Arope indicator, related to the EU-SILC, have already been assessed.

The need to address this objective in Europe is urgent, since it is a political space that aims to advance in the convergence of inclusion policies and in the improvement of social cohesion. It will be difficult to assess progress in this field of European policy if we are not able to measure the possible transformations in the social situations that people face.

Appendix

See Figs. 2, 3, 4 and 5; Tables 2, 3, 4 and 5.
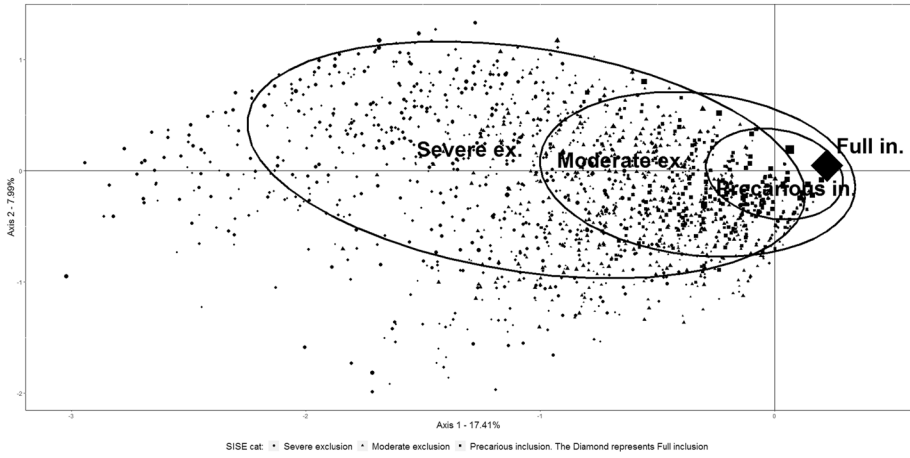
Fig. 2 Multiple correspondence analysis for 35 exclusion indicators: representation of positions in two main factors according to categories assigned from the SISE. *Source* Survey on Social Needs and Social Integration 2018. FOESSA Foundation
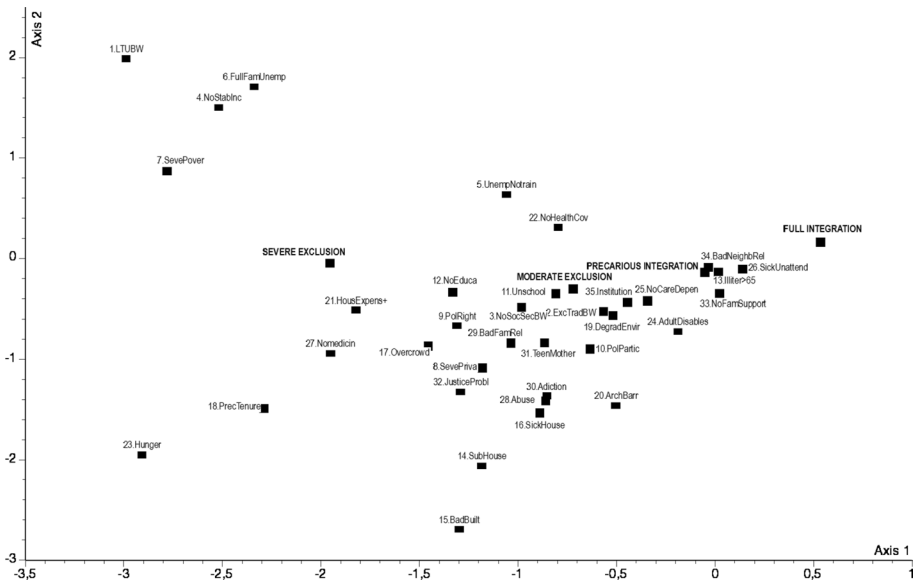
Fig. 3 Positioning of exclusion indicators in the social space, based on MCA. *Source* Survey on Social Needs and Social Integration 2018. FOESSA Foundation
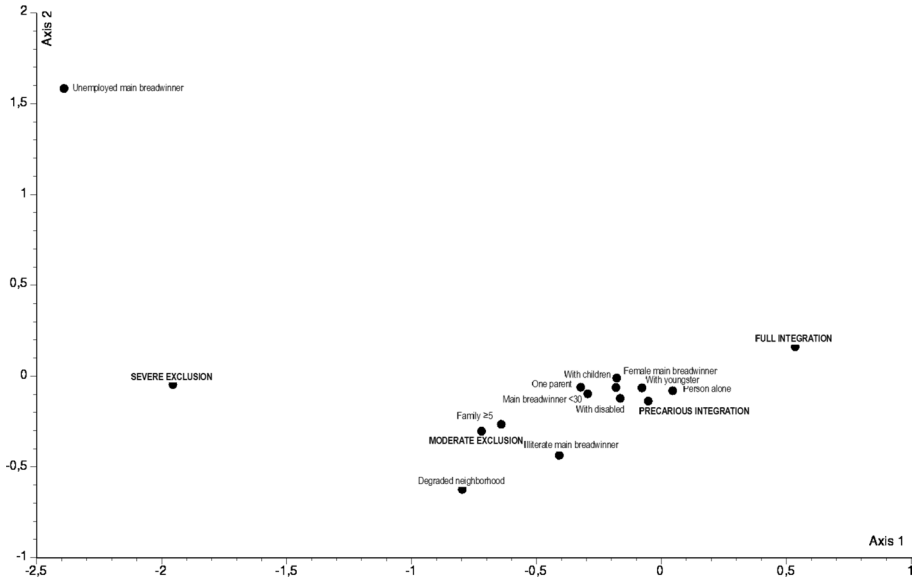
Fig. 4 Positioning of various social groups (Odds of exclusion). *Source* Survey on Social Needs and Social Integration 2018. FOESSA Foundation
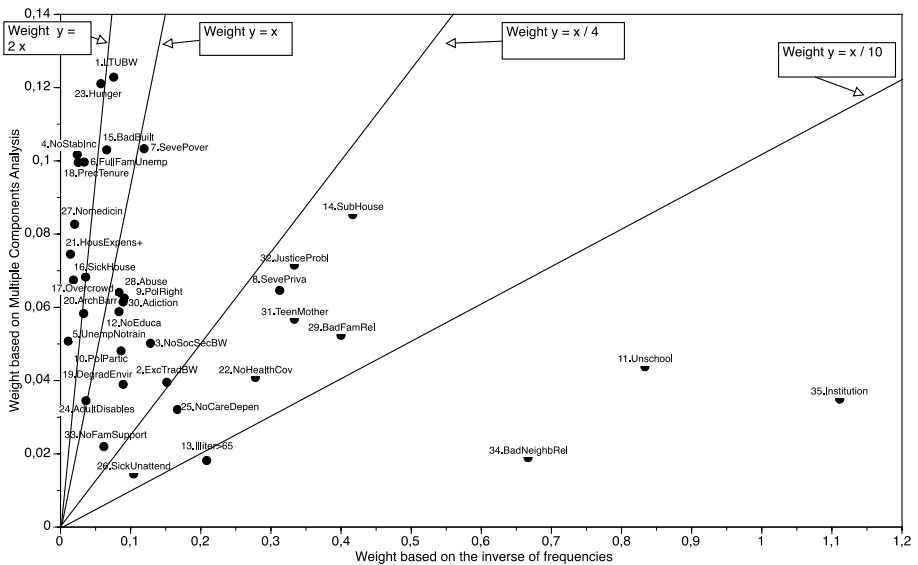
Fig. 5 Weight from MCA distances in relation to the weighting based on the inverse of the percentage. *Source* Survey on Social Needs and Social Integration 2018. FOESSA Foundation

Table 2 Weights of FOESSA social exclusion indicators calculated with the inverse of percentage method. *Source:* Survey on Social Needs and Social Integration 2018. FOESSA Foundation

Dimension	Number and label	Indicators	%	1 / Percentage	Weights 2018*
d1. Employment	1.LTUBW	Households whose main breadwinner has been unemployed for a year or more	2.9	0.345	0.0575
	2.ExcTradBW	Households whose main breadwinner has an exclusionary job: door to door seller, street sales support, marginal street sales, unskilled household worker, seasonal farm worker, cardboard picker, propaganda distribution, panhandling	1.1	0.909	0.1515
	3.NoSocSecBW	Households whose main breadwinner has an exclusionary job: no social security coverage (irregular employment)	1.3	0.769	0.1282
	4.NoStabInc	Households without employed persons, nor contributory pensioners, nor on leave, nor with contributory unemployment benefits	7.0	0.143	0.0238
	5.UnempNotrain	Households with unemployed people who have not received occupational training in the last year	15.2	0.066	0.0110
	6.FullFamUnemp	Households with all active members unemployed	6.6	0.152	0.0253
d2. Consumption	7.SevePover	Extreme poverty: Income below 30% of the median family income equivalent to stable €	4.2	0.238	0.1191
	8.SevePriva	Households lacking goods considered basic by more than 95% of society (running water, hot water, electricity, sewage disposal, complete bathroom, kitchen, washing machine, refrigerator) by not being able to afford it	1.6	0.625	0.3125
d3. Political participation	9.PolRight	Right to choose your political representatives and to be elected: households with someone 18 years of age or older, of non-EU nationality	5.6	0.179	0.0893
	10.PolPartic	Effective ability to be considered and to influence the collective decision-making process: they do not participate in elections due to lack of interest and are not members of any civil society association	5.8	0.172	0.0862
d4. Access to education	11.Unschool	Households with children from 3 to 15 out of school	0.4	2.500	0.8333
	12.NoEduca	Households in which no one from 16 to 64 years of age has educational qualification: from 16 to 44, without completing Basic Schooling or a Secondary Education certificate; 45 to 64, fewer than 5 years in school	4.0	0.250	0.0833
	13.Illiter>65	Households with illiterate members 65 years or older	1.6	0.625	0.2083

Table 2 (continued)

d5. Access to housing	14.SubHouse	Substandard housing: shack, retail space, mobile home, prefabricated home or similar	0.3	3.333	0.4167
	15.BadBuilt	Serious deficiencies in construction, ruin, etc	1.9	0.526	0.0658
	16.SickHouse	Damp, dirt and odors (unhealthy) in the house	6.8	0.147	0.0184
	17.Overcrowd	Serious overcrowding (<15 m / person)	3.5	0.286	0.0357
	18.PrecTenure	Precarious tenure (provided free of charge by other persons or institutions, subrented, illegally occupied)	3.7	0.270	0.0338
	19.DegradEnvir	Very degraded environment	1.4	0.714	0.0893
	20.ArchBarr	Architectural barriers with physically disabled people in the home	3.8	0.263	0.0329
	21.HousExpens+	Excessive housing expenses (income—living expenses <extreme poverty threshold)	8.9	0.112	0.0140
d6. Access to health	22.NoHealthCov	Someone without health coverage	0.6	1.667	0.2778
	23.Hunger	They have frequently gone hungry in the last 10 years or they go hungry now	2.2	0.455	0.0758
	24.AdultDisables	All adults with disabilities, chronic illness or serious health problems that generate limitations for daily life activities	4.6	0.217	0.0362
	25.NoCareDepen	Households with dependent people (who need help or care from other people to carry out the activities of daily living) and who do not receive it	1.0	1.000	0.1667
	26.SickUnattend	Households with sick people, who have not used health services in one year	1.6	0.625	0.1042
	27.Nomedicin	Households that have stopped buying medicine, following treatments or diets due to economic problems	8.3	0.121	0.0201
d7. Social conflict	28.Abuse	Someone in the household has received or receives physical or psychological abuse in the last 10 years	2.4	0.417	0.0833
	29.BadFamRel	Households with very bad, bad, or rather bad relationships	0.5	2.000	0.4000
	30.Adiction	Households with people who have or have had problems with alcohol, other drugs or gambling in the last 10 years	2.2	0.455	0.0909
	31.TeenMother	Someone has been or is about to become a teenage mother without a partner	0.6	1.667	0.3333
	32.JusticeProbl	Households with people who have or have had problems with the justice system in the last 10 years (criminal record)	0.6	1.667	0.3333

Table 2 (continued)

d8. Social isolation	33.NoFamSupport	People without relationships at home and who do not have any support for situations of illness or difficulty	5.4	0.185	0.0617
	34.BadNeighbRel	Households with bad or very bad relationships with neighbors	0.5	2.000	0.6667
	35.Institution	Households with people in institutions: psychiatric hospitals and facilities, drug addiction centers, child protection facilities, prisons, halfway and transient houses or women's shelters	0.3	3.333	1.1111

*The final weight of every indicator is the inverse of percentage divided by the number of indicators of its domain (d1 = 6; d2 = 2; d3 = 2; d4 = 3; d5 = 8; d6 = 6; d7 = 5 and d8 = 3)

Table 3 Weights of FOESSA social exclusion indicators calculated with the distance from the indicators ("yes" modality) to the full integration point. *Source* Survey on Social Needs and Social Integration 2018. FOESSA Foundation

Dimension	Label	Indicators	Euclidian distance to full integration point (factors 1 and 2)	Weighs 2018
d1. Employment	1.LTUBW	Households whose main breadwinner has been unemployed for a year or more	3.98	0.1211
	2.ExcTradBW	Households whose main breadwinner has an exclusionary job: door to door seller, street sales support, marginal street sales, unskilled household worker, seasonal farm worker, cardboard picker, propaganda distribution, panhandling	1.30	0.0395
	3.NoSocSecBW	Households whose main breadwinner has an exclusionary job: no social security coverage (irregular employment)	1.65	0.0502
	4.NoStabInc	Households without employed persons, nor contributory pensioners, nor on leave, nor with contributory unemployment benefits	3.34	0.1017
	5.UnempNotrain	Households with unemployed people who have not received occupational training in the last year	1.67	0.0508
	6.FullFamUnemp	Households with all active members unemployed	3.27	0.0996
d2. Consumption	7.SevePover	Extreme poverty: Income below 30% of the median family income equivalent to stable Euros	3.39	0.1033
	8.SevePriva	Households lacking goods considered basic by more than 95% of society (running water, hot water, electricity, sewage disposal, complete bathroom, kitchen, washing machine, refrigerator) by not being able to afford it	2.12	0.0646
d3. Political participation	9.PolRight	Right to choose your political representatives and to be elected: households with someone 18 years of age or older, of non-EU nationality	2.02	0.0615
	10.PolPartic	Effective ability to be considered and to influence the collective decision-making process: they do not participate in elections due to lack of interest and are not members of any civil society association	1.58	0.0481

Table 3 (continued)

Dimension	Label	Indicators	Euclidian distance to full integration point (factors 1 and 2)	Weighs 2018
d4. Access to education	11.Unschool	Households with children from 3 to 15 out of school	1.44	0.0438
	12.NoEduca	Households in which no one from 16 to 64 years of age has educational qualification: from 16 to 44, without completing Basic schooling or Secondary Education certificate; 45 to 64, fewer than 5 years in school	1.93	0.0588
	13.Illiter>65	Households with illiterate members 65 years or older	0.60	0.0182
	14.SubHouse	Substandard housing: shack, retail space, mobile home, prefabricated home or similar	2.80	0.0853
d5. Access to housing	15.BadBuilt	Serious deficiencies in construction, ruin, etc	3.38	0.1030
	16.SickHouse	Damp, dirt and odors (unhealthy) in the house	2.22	0.0675
	17.Overcrowd	Serious overcrowding (<15 m / person)	2.24	0.0683
	18.PrecTenure	Precarious tenure (provided free of charge by other persons or institutions, subrented, illegally occupied)	3.27	0.0997
	19.DegradEnvir	Very degraded environment	1.28	0.0390
	20.ArchBarr	Architectural barriers with physically disabled people in the home	1.92	0.0583
	21.HousExpens +	Excessive housing expenses (income—living expenses <extreme poverty threshold)	2.45	0.0745
d6. Access to health	22.NoHealthCov	Someone without health coverage	1.34	0.0409
	23.Hunger	They have frequently gone hungry in the last 10 years or they go hungry now	4.03	0.1229
	24.AdultDisables	All adults with disabilities, chronic illness or serious health problems that generate limitations for daily life activities	1.13	0.0345
	25.NoCareDepen	Households with dependent people (who need help or care from other people to carry out the activities of daily living) and who do not receive it	1.05	0.0321
	26.SickUnattend	Households with sick people, who have not used health services in one year	0.48	0.0145
	27.Nomedicin	Households that have stopped buying medicine, following treatments or diets due to economic problems	2.72	0.0827

Table 3 (continued)

Dimension	Label	Indicators	Euclidian distance to full integration point (factors 1 and 2)	Weighs 2018
d7. Social conflict	28.Abuse	Someone in the household has received or receives physical or psychological abuse in the last 10 years	2.10	0.0641
	29.BadFamRel	Households with very bad, bad, or rather bad relationships	1.72	0.0524
	30.Adiction	Households with people who have or have had problems with alcohol, other drugs or gambling in the last 10 years	2.05	0.0625
	31.TeenMother	Someone has been or is about to become a teenage mother without a partner	1.86	0.0568
	32.JusticeProbl	Households with people who have or have had problems with the justice system in the last 10 years (criminal record)	2.35	0.0715
d8. Social isolation	33.NoFamSupport	People without relationships at home and who do not have any support for situations of illness or difficulty	0.72	0.0220
	34.BadNeighbRel	Households with bad or very bad relationships with neighbors	0.62	0.0190
	35.Institution	Households with people in institutions: psychiatric hospitals and facilities, drug addiction centers, child protection facilities, prisons, halfway and transient houses or women's shelters	1.15	0.0350

Table 4 Social exclusion rates for different groups of households calculated with the inverse of the percentage method and the distance to the integration point method. *Source* Survey on Social Needs and Social Integration 2018. FOESSA Foundation

		Inverse of the percentage						Distance					
		Integrated	Precarious Integration	Compensated Exclusion	Severe Exclusion	Exclusion Total	SISE	Integrated	Precarious Integration	Compensated Exclusion	Severe Exclusion	Exclusion Total	SISE
Main breadwinner by sex	Male	52.6	33.9	7.9	5.6	13.5	0.90	52.6	32.1	9.3	6.0	15.3	0.93
	Female	41.9	40.1	10.1	7.8	17.9	1.19	41.9	38.1	12.6	7.3	19.9	1.13
Main breadwinner by age groups	Up to 29	34.8	48.3	7.9	9.0	16.9	1.34	34.8	35.5	19.6	10.1	29.6	1.48
	30 to 44	49.6	34.0	9.3	7.1	16.4	1.08	49.6	30.8	11.5	8.1	19.6	1.14
	45 to 64	48.7	35.1	8.8	7.3	16.1	1.04	48.7	32.8	10.5	8.0	18.4	1.10
	65 and over	52.0	36.1	8.0	3.9	11.9	0.79	52.0	38.5	7.4	2.1	9.5	0.63
Main breadwinner by educational level	Illiterate	6.8	3.9	68.0	21.4	89.3	3.40	6.8	64.1	17.5	11.7	29.1	1.75
	Less than school diploma	35.8	41.5	14.3	8.5	22.7	1.38	35.8	40.7	13.4	10.2	23.6	1.38
	School Graduate. elementary high school	47.0	37.7	8.2	7.1	15.4	1.10	46.9	32.9	11.2	9.0	20.2	1.19
	High School diploma	52.1	35.0	7.1	5.9	13.0	0.87	52.1	33.3	10.3	4.4	14.7	0.85
	Undergraduate or professional certificate	63.9	30.7	2.4	3.0	5.4	0.51	63.9	28.2	6.2	1.8	7.9	0.51

Table 4 (continued)

		Inverse of the percentage						Distance					
		Integrated	Precarious Integration	Compensated Exclusion	Severe Exclusion	Exclusion Total	SISE	Integrated	Precarious Integration	Compensated Exclusion	Severe Exclusion	Exclusion Total	SISE
Main breadwinner by activity status	Working	54.1	33.8	6.4	5.7	12.1	0.85	54.1	34.5	8.7	2.7	11.4	0.69
	Unemployed	0.2	45.5	29.2	25.2	54.4	3.08	0.2	11.2	29	59.6	88.6	5.20
	Retired	52.6	36.1	7.7	3.6	11.3	0.75	52.6	36.6	8.0	2.7	10.7	0.67
	Other	30.7	46.0	14.3	9.1	23.4	0.75	30.7	38.3	20.5	10.5	31.0	0.67
Household size	Person alone	39.4	44.4	9.2	7.0	16.3	1.15	39.4	40.4	13.9	6.4	20.2	1.11
	2 to 4 members	54.6	32.3	7.7	5.4	13.1	0.85	54.6	31.9	8.3	5.3	13.6	0.85
	5 or more members	26.3	43.2	16.1	14.3	30.4	1.98	26.3	33.8	20.4	19.5	39.9	2.21
Family structure	Not nuclear	38.8	44.5	9.6	7.1	16.7	1.16	38.8	40.7	14.0	6.6	20.6	1.12
	Single nucleus	53.9	32.1	8.2	5.8	14.0	0.90	53.9	31.5	8.5	6.1	14.6	0.92
	Polynuclear	21.4	54.8	10.7	13.0	23.7	1.87	21.4	36.5	27.8	14.4	42.1	1.97

Table 4 (continued)

		Inverse of the percentage						Distance					
		Integrated	Precarious Integration	Compensated Exclusion	Severe Exclusion	Exclusion Total	SISE	Integrated	Precarious Integration	Compensated Exclusion	Severe Exclusion	Exclusion Total	SISE
Household composition	Monoparental nucleus present	33.2	41.1	14.6	11.1	25.7	1.70	33.2	38.3	15.3	13.3	28.6	1.66
	Seniors present	52.0	35.3	8.6	4.1	12.7	0.82	52.0	38.5	7.4	2.2	9.5	0.63
	Minors present	46.1	36.2	9.2	8.4	17.7	1.22	46.1	32.1	11.6	10.2	21.8	1.30
	Youth present	40.5	41.2	10.4	7.8	18.2	1.24	40.6	35.5	13.7	10.2	24.0	1.35
	Employed present	53.5	34.3	6.7	5.6	12.3	0.85	53.5	34.5	9.1	2.9	12.0	0.71
	Unemployed present	8.1	59.5	18.3	14.1	32.3	1.91	8.1	42.3	22.7	26.8	49.5	2.87
	Person with severe or less severe health limitations present	28.9	45.8	15.6	9.7	25.3	1.56	28.9	47.8	13.5	9.7	23.3	1.42

Table 4 (continued)

		Inverse of the percentage						Distance					
		Integrated	Precarious Integration	Compensated Exclusion	Severe Exclusion	Exclusion Total	SISE	Integrated	Precarious Integration	Compensated Exclusion	Severe Exclusion	Exclusion Total	SISE
Household nationality	All Spanish	52.9	35.1	7.0	5.1	12.0	0.85	52.9	33.8	8.6	4.8	13.4	0.83
	Some foreigners	21.2	42.8	20.5	15.6	36.0	2.08	21.1	36.8	23.7	18.4	42.1	2.23
Type of neighborhood	Neighborhood in good condition	50.7	35.7	8.1	5.5	13.6	0.90	50.7	34.0	9.7	5.6	15.3	0.91
	Degraded. marginal neighborhood	20.1	41.4	17.9	20.6	38.5	2.56	20.1	36.5	22.2	21.2	43.4	2.40
Size of town	More than 100.000 inhab	50.2	34.8	8.3	6.7	15.0	1.00	50.2	32.0	11.2	6.5	17.7	0.99
	50.000–100.000	49.7	35.6	7.4	7.3	14.7	1.06	49.6	34.4	9.4	6.6	16.0	1.01
	20.000–50.000	41.7	39.1	10.8	8.4	19.3	1.24	41.7	36.8	14.2	7.4	21.6	1.22
	5.000–20.000	47.2	39.0	8.3	5.5	13.8	0.95	47.2	37.3	9.2	6.3	15.5	0.99
	Fewer than 5.000	53.9	32.9	9.4	3.8	13.2	0.78	54.0	33.5	7.3	5.2	12.6	0.83
	Total excluded	48.9	36	8.6	6.4	15.0	1.00	49.0	34.1	10.5	6.4	16.9	1.00

Table 5 Social exclusion rates for the Spanish population calculated with the inverse of the percentage method and the distance to the integration point method. *Source* Survey on Social Needs and Social Integration 2018. FOESSA Foundation

		Inverse of percentage						Distance					
		Integrated	Precarious Integration	Com-pensated Exclusion	Severe Exclusion	Exclusion Total	SISE	Integrated	Precarious Integration	Com-pensated Exclusion	Severe Exclusion	Exclusion Total	SISE
Sex	Male	49.0	35.5	8.7	6.8	15.5	1.04	49.0	32.6	10.6	7.7	18.3	1.09
	Female	47.8	35.9	9.1	7.2	16.3	1.07	47.8	33.8	10.9	7.4	18.4	1.08
Age	Up to 29	42.6	38.4	9.7	9.3	19	1.30	42.6	33.0	13.2	11.3	24.5	1.42
	30 to 44	50.0	34.2	8.9	6.9	15.8	1.05	50.0	31.1	11.2	7.7	18.9	1.10
	45 to 64	49.1	36.2	8.2	6.5	14.7	0.95	49.1	33.3	10.5	7.1	17.6	1.04
	65 and over	55.3	32.2	8.5	4.0	12.5	0.78	55.3	36.2	6.6	1.9	8.5	0.58
Educational level	Illiterate	8.5	8.9	67.1	15.5	82.6	3.10	8.5	60.1	15.0	16.4	31.5	1.86
	Less than school diploma	36.7	39.3	14.7	9.3	24	1.44	36.7	38.2	14.4	10.7	25.0	1.42
	School Graduate. elementary high school	44.6	39.2	8.6	7.6	16.2	1.14	44.6	34.4	11.7	9.4	21.0	1.24
	High School diploma	54.2	34.4	6.5	4.9	11.4	0.77	54.2	32.6	8.8	4.4	13.2	0.81
	Under-graduate or professional certificate	63.8	30.3	3.0	3.0	5.9	0.50	63.8	28.7	6.0	1.5	7.5	0.50

Table 5 (continued)

		Inverse of percentage						Distance					
		Integrated	Precarious Integration	Compensated Exclusion	Severe Exclusion	Exclusion Total	SISE	Integrated	Precarious Integration	Compensated Exclusion	Severe Exclusion	Exclusion Total	SISE
Activity status	Working	57.3	31.9	6.0	4.8	10.8	0.77	57.3	32.3	7.9	2.4	10.4	0.64
	Unemployed	3.1	62.3	18.3	16.3	34.6	2.10	3.1	41.5	24.6	30.8	55.4	3.22
	Retired	54.4	33.7	8.0	3.8	11.9	0.78	54.4	35.5	7.3	2.8	10.1	0.65
	Other	48.3	33.6	10.8	7.4	18.1	1.15	48.3	31.9	11.7	8.2	19.8	1.13
Nationality	Spanish	52.0	35.0	7.3	5.7	13	0.91	52.0	33.1	9.1	5.9	15.0	0.92
	Foreigner	16.7	41.8	23.3	18.2	41.5	2.37	16.7	35.0	25.6	22.7	48.3	2.61
	Total exclusion	48.4	35.7	8.9	7.0	15.9	1.05	48.4	33.3	10.8	7.6	18.3	1.09

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