

**FOOD INSECURITY AND SOCIAL EXCLUSION IN THE  
METROPOLITAN AREA OF BARCELONA: A QUANTITATIVE VIEW**

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**THESIS**

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## ABSTRACT

Given the context of social exclusion and food insecurity in Europe, this study aimed to analyse food insecurity in the Metropolitan Area of Barcelona, mapping its dimension and its relationship to social exclusion. In order to accomplish its purpose, the presented study was based in quantitative methods using the database from the Health Survey of Catalunya 2015-2017. It was made using as measurement for food security the Body Mass Index and different social exclusion variables that sought to represent its multidimensional and multifactorial aspect. With those measures and variables, it was possible to correlate both concepts and capture the existing associations. Through the statistical analyses performed, it was found out that factors related to the economic and formative spheres of social exclusion are associated with obesity and overweight. Moreover, it was verified that overweight and obesity rates increase progressively depending on the individual's age and that age impacts the relationship between economic factors and food security.

**KEYWORDS:** Food security; Social Exclusion; Obesity; Overweight.

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## 1. Introduction

### 1.1 Statement of the problem

In 2015, 122 million people, or 24.4% of the population in the European Union (EU) were considered at risk of poverty or social exclusion. In order to receive this categorization, they were in at least one of the following conditions: at-risk-of-poverty after social benefits; severely materially deprived or living in households with very low work intensity (Eurostat, 2015). It is important to emphasize, though, that economic factors are not solely responsible for this situation of social exclusion. Social exclusion refers to a social model in which a sector of the population has no social or citizen rights (Castel, 1997) and is defined by the impossibility or intense difficulty of accessing the mechanisms of personal development and socio-community insertion (Brugué et al., 2002). According to Joan Subirats et al. (2004), social exclusion today addresses a complex mosaic of realities that include, in addition to income poverty, material deprivation and economic strains, aspects related to work insecurities, formative and training deficits, difficulties in accessing decent housing, fragile health conditions, the scarcity of social and family networks, among others. These factors interact with each other and impact people with different intensities and at different periods of life. For this reason, social exclusion is considered a dynamic, multifactorial and multidimensional phenomenon (Brugué et al., 2002).

This complex mosaic is part of the “Change of Era” context (Gomà, 2018). In addition to the fact that this context is affected by various changes in social structures, it is also associated with rapid transitions in nutrition and lifestyles, as well as changes in dietary patterns and food systems that may generate or aggravate health issues. According to the Food and Agriculture Organization of the United Nations (FAO), in 2018, 102 million individuals (9 percent of the total) from high-income countries were in a situation of food insecurity (WHO, 2018). Furthermore, as stated by the World Health Organization (WHO), six out of ten diseases are related to food, the most prominent ones being hypertension, high cholesterol, iron deficiency, overweight, obesity and diabetes<sup>1</sup>. These diseases are part of the European context and are alarming: in most of the EU Member States, weight problems and obesity are

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<sup>1</sup> Available at < <https://www.elperiodico.com/es/sociedad/20180130/la-oms-afirma-que-6-de-cada-10-enfermedades-tienen-relacion-con-alimentacion-6588035>>, Accessed on March 15 of 2019.

increasing at a rapid rate, with estimates that 51.6% of the EU adult population (18 years and over) was overweight in 2014 (Eurostat, 2015).

Food insecurity refers to the restricted, inadequate or uncertain access of people or households to healthy, nutritious and socially acceptable food that meet the nutritional requirements to carry out a healthy and productive life, both in quantity and in quality. In high-income countries, however, sizeable portions of the population lack regular access to nutritious and satisfactory food and as a result, malnutrition and poor diet arise as problems to be faced. These factors, as pointed out by several studies, are related to the lack of financial resources (Mclyntre, 2003), as well as physical, social and cultural aspects that may constitute barriers to food security.

The definition of social exclusion as the impossibility or intense difficulty of accessing the mechanisms of personal development and socio-community insertion, as well as the difficulty of accessing nutritious food that represents a situation of food insecurity, suggests a dialogue between the themes, as both concern access.

Given the context, reducing the number of people at risk of poverty or social exclusion is one of the key targets of the European 2020 strategy. Additionally, food security is a very ambitious, stand-alone goal in the 2030 Agenda for Sustainable Development of the United Nations: “*End hunger, achieve food security and improved nutrition and promote sustainable agriculture*” (Buse, 2015, p. 13). It also appears as a second target, focused on ending all forms of malnutrition.

## **1.2 Research gaps and justification of the research**

Despite the international support, food insecurity and malnutrition do not appear to be a high priority in the Catalan context. As mentioned in a study by the Autonomous University of Barcelona about food security in Barcelona from a global and non-reductionist approach to needs from 2015-2017, food insecurity is an invisible problem in Catalunya. Although there are projects and public policies focused on raising awareness and promoting healthy eating habits at the local level - in this case, in some specific neighbourhoods of Barcelona -, food insecurity is not on the public agenda. Moreover, there is no control or monitoring of this phenomenon by the government, including the Government of Catalunya (Generalitat) and the Barcelona’s City Hall. Additionally, through literature and documental review the lack of data and quantitative information about food insecurity have been verified, in both governmental and academic fields.



The dynamism and the accelerated speed of social processes and changes in this “Change of Era” is leading to increasingly complex and fluid realities (Gomà, 2018). Given the multifactorial and multidimensional characteristics of social exclusion, as well as the aggravation of health issues and food insecurity - adding to the invisibility of the problem - it is considered necessary to conduct studies focused on these complex issues. In order to better understand and measure this situation, further studies regarding food insecurity, malnutrition and social exclusion are critically needed, especially ones with a quantitative perspective.

How does food insecurity relate to the current context of social exclusion? To what extent and how the exposure to social exclusion situations - such as economic strains, unemployment, precarious work, difficulties in living conditions or access to housing, and so on. – impact on food insecurity and malnutrition? How and in what food security dimensions? These are some of the questions that prompt the present research. Therefore, this study aims to analyse food insecurity in the Metropolitan Area of Barcelona, mapping its dimension and its relationship to social exclusion.

This research is organized as follows. First, we present and discuss the concepts of food security, social exclusion and their spatial dimensions (section 2). Then we expose the methodology used, explaining the research design; how the key concepts were operationalized, and the method used for data analysis (section 3). In the third part, we present the results from the data analysis (section 4) and their discussion (section 5). Lastly, the research conclusions (section 6).

### **1.3 Contributions**

A thorough exploration of food security and social exclusion will help identify additional links and advance the knowledge and understanding of these issues. More specifically, this study contributes to the production of quantitative information about the problem of food insecurity in the studied territory; to the discussion and analysis of food insecurity and its relation not only with income, as it is traditionally associated, but with factors of social exclusion; to the generation of insights for possible public policies or interventions focused on groups that are subject to different dynamics of social exclusion and food insecurity and, finally it contributes to the debate and discussion of both issues, being useful to future researches and other academic fields.

## 2. Literature review

In this section, we present concepts of food security and social exclusion that will serve as the basis for the analysis and the discussions proposed by this study. Through this literature review, the first two subsections intend to demonstrate the multidimensional and complex character of both themes. The third subsection discusses their spatial dimension, indicating how spatial aspects permeate both concepts and therefore justify the need to consider this aspect both in the analysis and in public interventions and policies.

### 2.1 Food security

Food security is now listed among social determinants of health. Indeed, it is a determinant of several factors – such as life, health, dignity, citizenship, justice, and sustainable development (McIntyre, 2003). Food security, as defined by the United Nations' Committee in the World Food Summit of 1996 (and reconfirmed in 2002), exists “*when all people, at all times, have physical, social, and economic access to sufficient, safe, and nutritious food to meet their dietary needs and food preferences for an active and healthy life*” (FAO, 1996, para.8). Nonetheless, food insecurity is an important issue not only in low or middle-income countries – where its presence is more evident - but also in high-income countries (Burns et al., 2010).

In high-income countries, food insecurity is usually associated with low consumption of fruits, vegetables and meat (Tarasuk, 2001), leading to a decrease in nutrient and micronutrient consumption (Cook, 2002; Tarasuk, 1999). It has also been suggested that food insecurity in these countries may lead to a higher intake of inexpensive energy dense foods (Drewnowski, 2004). All these factors affect nutritional outcomes and increase the risk of the population becoming overweight and/or obese (Webb et al., 2004; Drewnowski and Specter, 2004).

These nutritional factors are associated with different dimensions of food security, ones that should be explored in order to understand the mentioned reality, due to the complexity of the theme. The FAO definition of food security explicitly considers this by emphasizing its four dimensions: availability, access, utilization, and stability. In particular, availability refers to the “*physical supply of food from all possible sources*” (WFP, 2009, p. 17), and access represents the “*economic, physical, and social ability to acquire adequate amounts of food*” (WFP, 2009, p. 17) through a combination of different sources. This last definition underscores

the multi-layered nature of having food access, in which the following sub-dimensions can be distinguished:

- i) physical access: when food is accessible through good infrastructure facilities, proximity to markets, etc;
- ii) economic or financial access: the financial ability to acquire adequate food;
- iii) social access: food is acquired and/or consumed in socially acceptable ways (WFP, 2009).

The third dimension of food security – utilization - points to the “households’ use of the food to which they have access, and to the individual efficiency in biologically converting nutrients in order to meet their specific nutritional and health needs (WFP 2009, *ibidem*). Being able to convert food into good nutrition depends on mainly three elements (Drèze and Sen, 1989):

- i) individual heterogeneities related to age, gender, health status, activity levels, etc.;
- ii) nutritional adequacy of the diet (in terms of the balance between macro and micronutrients), in order to minimize the risk of nutrient deficit and of hidden hunger (FAO, 2008); and, finally,
- iii) non-food elements, such as prevailing health and sanitary conditions, education and nutritional knowledge, care and feeding practices, and the availability of adequate food storage and processing facilities.

The fourth dimension, stability, refers to chronological determinants by emphasizing the permanence and sustainability of the three dimensions over time (Maxwell and Frankenberger, 1995; Barrett, 2010). It is important to distinguish between chronic food and nutrition insecurity and transitory food and nutrition insecurity, in order to provide adequate responses and actions.

The United States National Research Council incorporates experiences and perceptions in its description of food insecurity. It states that food insecurity is experienced by households and individuals when future food availability and access is deemed uncertain; when the quantity and quality of food required for a healthy lifestyle are insufficient, or when there is need to use socially unacceptable ways to acquire food (US, 2006). This definition integrates the perceptions of food insecurity and of “feelings of deprivation” in individuals, which may

trigger response behaviours that can deepen poverty and/or lead to transmitting poverty to next generations in the longer term. Some of these behaviours carry important nutritional risks, thus undermining health and productivity, especially for the most nutritionally vulnerable household members, such as pregnant and lactating women and young children, who have high nutrient requirements.

### **2.1.1 Food insecurity and malnutrition**

Food insecurity may contribute to different forms of malnutrition, such as i) undernutrition, which includes wasting (low weight-for-height), stunting (low height-for-age) and being underweight (low weight-for-age); ii) micronutrient-related malnutrition, which includes micronutrient deficiencies or micronutrient excess; and iii) being overweight and obese. Nowadays, undernutrition and obesity coexist in many countries, and can even be seen side by side in the same household. According to FAO's 2018 report, this multiple burden of malnutrition is more prevalent in low, lower-middle and middle-income countries, and is usually concentrated among the poor. It is important to note that, even though this reality is more often found in these regions, high-income countries are not exempted from obesity. As several evidence propose, food insecurity in these countries tends to be predictive of poor nutritional outcomes in adults (Bhattacharya et al., 2004) and to prevail more in women (Dinour et al., 2007). Obesity in these countries is also similarly concentrated among the poor (WHO, 2018).

The main pathways from food insecurity to malnutrition pass through food consumption or diet. For that reason, indicators of dietary intake are crucial to understanding the pathway from food insecurity to nutritional outcomes. Poor access to nutritious food due to its high cost, the stress of living with food insecurity, and physiological adaptations to food deprivation explain why food-insecure families may have a higher risk of being overweight or obese. Furthermore, the exposure to food insecurity is also related to anxiety, stress, depression and is also linked to chronic diseases (WHO, 2018).

In summary, malnutrition and concerns about lack of food are closely related to the lack of financial resources (Mclyntre, 2003). Health social determinants, as defined by the World Health Organization (WHO), confirm this statement and point out that socioeconomic positions, social inequalities, wealth distribution and access to basic material goods do influence health and consequently food security.

## 2.2 Social exclusion

There is a broad agreement among the social theorists about how society has changed from the 1990s to the first decade of the 21<sup>st</sup> century, which is analogue to an intensive, multidimensional and complex process of change. Therefore, the academic debate has been identifying cases of disqualification, vulnerabilities, and loss of ties that have since been incorporated to the concept of social exclusion.

It is important to briefly review the dimensions of social change ongoing as a requirement to support the need to overcome the concept of classic poverty and to introduce the complex and emerging idea of social exclusion. In the productive sphere, the impact of technological development in Western advanced capitalist countries should be highlighted, as it has completely modified the industrial bases that were previously in position. Massive production and consumption of homogeneous low-priced goods promoted by the Fordist model were gradually substituted. Globalization and economic internationalization, linked to the revolution of information systems, have aided to the development of a global market, in which the concepts of flexibility, adaptability and mobility substituted specialization and stability (Gallie and Pangan, 2000). The society of knowledge (Castells, 1999) emerged in this context, seeking differential values, in which the source of benefits and productivity are no longer rooted in the physical and human capital, but in the intellectual one. Therefore, the risks of social exclusion due to low educational qualification or formative obsolescence increased.

From a social structure perspective, the industrial society had instituted relatively stable and predictable arrangements. However, during a short period of time there was an intense transition from a fragmented society with well-defined social classes to a complex, dynamic and changing society (Brugué et al., 2002) in which the bipolarity between rich and poor is not as clear as before. Situations and circumstances that previously affected only certain groups began to affect other groups, and due to the failure and rigidity of the Welfare State in Europe (Esping-Andersen, 1999) the risk has been democratized (Beck, 1992), punishing the usual ones more severely, but also hitting new layers and people (Edwards and Glover, 2001). Associated with these increasing risks, new possibilities of social mobility began to appear in different levels, as well as opportunities in social segments that previously only had the option to remain in poverty. Nonetheless, unexpected groups and impoverished situations are still present, and consequently we now have a fragmented mosaic, opposed to the previous, static and dual scenario. With different circumstances of poverty, richness, failure and success, the democratization of risks and the fragmentation of society, new social and spatial segmentations

are being configured. Additionally, new spatial inequalities emerge, especially in the urban context.

Within socio-relational structures historically grounded on familiar organizations and patriarchies, transformations in gender perspectives are also part of this period of change. The threading equality between men and women, the increasing entrance of women in the labour world -despite continuous and evident discrimination-, the growth of tensions due to women's double working hours, and the increase in divorces as well as single-parents are some examples of these transformations (Sainsbury, 1999). These, however, are associated with new social instabilities, factors and layers of exclusion, in which gender still results as a determining variable (Subirats et al., 2004).

Furthermore, and more recently, it is possible to emphasize new complexities, doubts and daily challenges related to the spheres explained above that also impact on social exclusion. New challenges have resulted from different elements, such as the crisis in patriarchal organizations, the difficulties in receiving, including and creating multicultural citizenships, the social risks that come from demographic transitions and the inequalities related to dwelling and non-traditional familiar arrangements. Furthermore, vulnerabilities related to the socioeconomic sphere are intensified and are summarized at the core of global financial capitalism and the financialization of housing (Gomà, 2018).

The concept of social exclusion is immersed in this dynamic context and it is part of a picture with a growing level of heterogeneity, representing “*fractures in the fabric of society and social ruptures of certain basic coordinates of integration*” (Brugué et al., 2002, p.11). This concept is broadly accepted and is also deemed to be a central element in many institutions that promote social inclusion. One argument that sustains it is that most definitions of poverty refer mainly or solely to economic and income inequalities, disregarding new social processes, dynamics and profiles, especially those related to the socio-relational sphere and to the gender perspective. Confronting situations of risk and vulnerability and having multiple triggers and dimensions, the concept of social exclusion has a greater explanatory capacity.

In summary, social exclusion refers to a social model in which a sector of the population has no social or citizen rights, constituting spaces of vulnerability and risk with different intensities (Castel, 1997). Considering that social issues were transformed and acquired a new nature in the emerging advanced technological societies, social exclusion can be seen as a reflection of them (Gil, 2002). Moreover, as defined by Brugué et al. (2002),

social exclusion is a structural, dynamic, multifactorial, multidimensional and politicizing phenomenon.

Since it affects different groups with distinct intensities, the boundaries of social exclusion are considered to be mobile and fluid (Brugué et al., 2002), and its determinants are as well. As shown in Table 1, social exclusion is composed of different spheres, such as economic, occupational, formative, sociosanitary, housing, relational and communitarian-political. Its multidimensional and multifactorial nature becomes noticeable within these various spheres and their interrelations.

It is important to note that these spheres do not usually work alone – most of the time, they are combined with other social exclusion factors, which are subject to different, intensifying circumstances. These circumstances or axes - gender, age, and ethnicity or origin - end up intertwining with social inequalities. As pointed out by several analyses and empirical studies, they intersect with the dynamics of inclusion and exclusion, strengthening them and printing, in each case, their own characteristics or elements. Therefore, women, young and/or elderly people, immigrants or people from poor countries, with a regularized administrative situation – or not - are most susceptible to vulnerability and social exclusion (Brugué et al., 2002).

Social exclusion also has a spatial dimension, since its processes are often concomitant to territorial and residential segregation, which are factors that promote exclusion themselves. As previously discussed, the social structure and the current productive dynamics have a strong impact on the territory and its inhabitants. The selective location of public transport and services, the financialization of urban production, as well as the unequal distribution of information and knowledge across distinct urban areas are aspects that can also affect people's lives. Therefore, it is understood that contextual conditions related to existing environmental, social, cultural and social policies influence directly in the processes of social exclusion (Subirats et al., 2004). That's why, in each vital space, it is considered necessary to introduce elements of the spatial perspective, which will be discussed in the next section.

Further explanations about social exclusion are not in the scope of this research; yet, through Table 1, it is possible to better understand its complexity and that its factors can occur alone or in combination with others, regardless of their spheres. This table will be used throughout the research to guide the food security analysis and its relation to social exclusion.

Table 1. Spheres, factor and intensifying circumstances of social exclusion

Spheres	Factors	Intensifying circumstances		
<b>Economic</b>	Economic poverty Material deprivation Economic strain Dependence of social benefits	<b>Gender</b>	<b>Age</b>	<b>Ethnicity/Nationality or place of birth</b>
<b>Occupational</b>	Access to the labour market Labour conditions			
<b>Formative</b>	Access to the educational system Educational level			
<b>Sociosanitary</b>	Life and health conditions Access to health resources Physical, mental and emotional health			
<b>Housing</b>	Accessibility Living conditions			
<b>Relational</b>	Family and personal networks Community links Rejection and social stigmatization			
<b>Communitarian-political</b>	Citizenship rights Participation			

Source: own elaboration based on the theory proposed by Brugué et al., 2002 and Subirats et al., 2004



### 2.3 Spatial dimension of social exclusion and food security

Although not new to the sociology debate, the social processes related to the “Change of Era”, as well as the changes in the Welfare State, are resulting in the emergence of new socio-spatial exclusion realities, which in turn are leading to a reevaluation of the debate on the spatial dimension of social exclusion in the urban context.

In general, social inequalities and situations of social exclusion have an increasingly spatial character, which vary according to scales and territorial units (Gomà, 2018). In addition, inequalities are not only observed in different territories or within the same territory, but also reproduced or intensified in the territory itself. If, on the one hand, spaces reflect social inequalities, on the other they can generate new ones. On the topic of food security, the socio-economic context at national, regional or local levels generates distinct dynamics of distribution and availability of resources and food, that affect food security dimensions and outcomes. Indeed, several studies have suggested that living in an urban area or in the outskirts of a big city can determine a higher risk of food insecurity (Grimaccia and Naccarato, 2019).

The theory of spatial justice proposed by Edward Soja argues that justice, regardless of its definition, has a consequential geography, a spatial expression that is more than just a background reflection or a set of physical attributes to be descriptively mapped. As suggested, *“the geography, or “spatiality” of justice is an integral and formative component of justice itself, a vital part of how justice and injustice are socially constructed and evolve over time. Viewed in this way, seeking spatial justice becomes fundamentally, almost inescapably, a struggle over geography”* (SOJA, 2013. p.1).

This new emphasis on urban spatial causality has emerged with the aim to explore the generative effects of urban agglomerations, not only on everyday behaviour but also on such processes as *“technological innovation, artistic creativity, economic development, social change as well as environmental degradation, social polarization, widening income gaps, international politics, and, more specifically, the production of justice and injustice”* (SOJA, 2013. p.1).

The impact of the spatial component on people's life opportunities is obvious when we consider territorial scales as wide as continents or countries. Even within the same state, inter-regional inequalities tend to be significant and easily observed. In the local level, however, this incidence is not so easily identified, although it does exist in a substantial way. Inequalities between cities are often important and respond to various events, such as the specific dynamics

of the metropolitan economy or the unequal spatial impact of socio-demographic changes such as immigration or aging, as well as the public policies developed by local governments (Blanco et al., 2011). Even so, it is not easy to identify the elements that influence spatial justice, especially in small areas such as neighbourhoods, due to the difficulty to capture the determinants that influence the quality of life among people living in a given neighbourhood.

However, numerous studies conclude that socio-spatial characteristics of residential areas affect - beyond the individuals' own attributes - certain attitudes or behaviours of its inhabitants, conditioning some social processes that are crucial to the configuration of their socio-economic situation. The related studies refer to “neighbourhood effects” and indicate that poverty becomes more severe if you live in an impoverished residential environment (Atkinson and Kintrea, 2001; Buck, 2001; Dorling et al., 2001; Buck and Gordon, 2004). Living in these environments limits social mobility and other social processes, not only because it maximizes the difficulty in finding work, but also because of available resources - social, environmental, geographic and institutional - that increase the risk of persisting in a situation of social exclusion.

Resources, infrastructure, physical, human and social capital are distributed and produced differently throughout urban space. Given the importance of space for everyday life, its transversal characteristic, as well as issues related to the right to the city and neighbourhood effects, living in a particular neighbourhood can affect food security. Depending on the spatial aspects, certain attitudes and behaviours related to eating habits can be impacted. In this sense, the spatial dimension of social exclusion can be associated with the availability, accessibility and utilization dimensions of food security. To clarify this relationship, food access, for example, is conditioned to economic and physical access. Therefore, depending on the economic resources and the presence of markets, grocery shops, consumer cooperatives, and agroecological organizations, as well as urban gardens and other community initiatives (such as community kitchens), different kinds of food are accessed and consumed. Nonetheless, the price and the availability of food vary in each neighbourhood (Duquette and Demers, 2005) and this can negatively affect food security - especially for individuals in a situation of social exclusion.

Another factor that impacts on food access is the presence of cooperatives, consumer groups, urban gardens, and other community initiatives. In the context of Catalunya, the investigation “Barris I Crisi” (Neighbourhoods and Crises) provides new and relevant information in order to further explore the relation between urban segregation and social

innovation, through the Mapa de la Innovació Social a Catalunya<sup>2</sup> (Map of Social Innovation in Catalunya). It seemingly indicates that social innovation is more likely to appear in neighbourhoods that suffer relatively little the effects of urban segregation - areas of average income and with a relatively high level of social mix - while it tends to occur less or not at all in areas where superior or inferior segregation prevails (Blanco et al., 2016, p.17). These disparities can influence the experience of food insecurity in the metropolitan area of Barcelona, as they reduce supply and consequently access to other and alternatives forms of food consumption.

Lastly, all these new risks, the social exclusion context and the importance of the spatial component also call for a spatial architecture of the welfare state, establishing a 21<sup>st</sup> century social citizenship from the centrality of the urban agenda. In this context, public policies of proximity emerge to deal with the “Change of Era” issues and are considered necessary in order to provide answers to these complex situations (Gomá, 2018). The local sphere, an important dimension of the new political and social scenario, understands governance as a potential space for deepening democracy, based on participation and proximity. Social transformation requires the recognition of spatial specificities of social issues, as well as overcoming the segmented and partial views of social reality. Public policies should, therefore, be transversal and promote the participation of different local actors, with the ability to improve the population's well-being.

In Spain, for example, there is an increasing reactivation of the municipal sphere as a space for collective action through practices of social innovation and community actions, and also as a project of political transformation, in which institutions are reconnecting with a democratic and participatory logic (Gomá, 2018). In the long term, this reactivation can be seen as an opportunity to develop public policies related to social exclusion and food security.

### **3. Methodology**

This section presents the research methodology. First, we cover the research design and methodology to provide an understanding of this study's projected direction. Second, we describe the methods of measurement of food security and social exclusion. Lastly, we present the method of data analysis used.

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<sup>2</sup>The map is available at this website <http://leyseca.net/barrisicrisi>. Also, for more details about the adopted methodology of the study, access <http://barrisicrisi.wordpress.com/category/mapa-innovacio-social>.

### 3.1 Research design and methodology

As mentioned in the introduction, the main objective of this research is to analyse the food insecurity in the metropolitan area of Barcelona, mapping its dimension and its relationship to social exclusion. As specific objectives, this research aims to identify groups that are experiencing food insecurity; to analyse if and how these groups relate to social exclusion factors and the intensifying circumstances of social exclusion, and lastly to analyse the influence of spatial factors in food insecurity. The following hypothesis guide the research:

- i) Social exclusion factors impact food insecurity.

For the purpose of this research, a statistical analysis of microdata from the Health Survey of Catalunya 2015-2017 focusing on the metropolitan area of Barcelona was performed. The Health Survey of Catalunya collects information on the population living in Catalunya, with no age limit, on the state of health, health-related behaviours and the use of health services. This provides relevant information for the establishment and evaluation of health policies specified in the Catalan Health Plan<sup>3</sup>.

Provided by the Government of Catalunya, through the Ministry of Health and with the collaboration of the Statistical Institute of Catalunya, the Health Survey of Catalunya was first performed in 1994 and then in 2002, 2006 and 2010. Only from 2010 onwards, it began to be carried out twice a year. This research utilized the 2015/2017 survey series.

Technical characteristics of the survey, such as its sampling methods, are not going to be described, though it is important to mention its robustness, in what refers to the area it covers and the different variables and aspects it analyses. Reviewing the survey's results over several years, it is possible to observe an increase in socioeconomic variables as well as other variables that capture the perception of health status and health services. This allowed all statistical analysis to be performed using the same database.

The initial sample contained 34.522 observations, taken from the microdata of the Health Survey of Catalunya from 2002 to 2017. Upon a review of the available data and

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<sup>3</sup> The survey consists of personal interviews conducted at the household level by an interviewer who applies questionnaires. The interviews are conducted in the language chosen by the interviewed person, Catalan or Spanish. Taking into account the interviewee's characteristics, three questionnaire models can be applied: a general questionnaire aimed at the adult population (15 years old and over), who answer the questions directly; a questionnaire for minors which is administered to parents, tutors or persons responsible for children under 15 years of age selected; and an indirect questionnaire, applied when a disability or illness prevents a person from responding. In this case, the caretaker is interviewed.

variables that could be used for this research, the years of 2015, 2016 and 2017 were selected. Taking into account this research's objective, of all the regions of Catalunya that are covered by the Survey, only those related to the Metropolitan Area of Barcelona were maintained.

The proposed analysis will, therefore, examine the Catalunyan adult population, specifically those between the ages of 18 and 60, that live in the Metropolitan Area of Barcelona and that participated in the health surveys taken from 2015 to 2017. This age range was chosen according to what the Department of Health of the Government of Catalunya considers to be an adult population. However, the limit of the adult population up to 60 years old was set in order to lessen the possible impact of aging in the food security analysis. After the cleaning and the selection, the sample resulted in 3.755 individual observations.

Nonetheless, among the variables that could represent the spatial dimension of food insecurity, disaggregated data at the neighbourhood or census section scale were not available in the Health Survey of Catalunya. As a result of this lack of data, it was not possible to further analyse the spatial dimension, what is intended to be done later in the doctoral dissertation. Therefore, this research focuses only on the issue of food insecurity in relation to social exclusion factors.

In the exploratory phase of the present research, an extensive literature review was carried out based on international documents and reports, especially those developed and supported by FAO, as well as national and regional documents from the Government of Catalunya (Generalitat de Catalunya) and the Barcelona City Hall. In order to understand how the issue of food security is addressed in the analysed territory, the main focus of the exploratory research was on regional and local public policies and the most relevant academic research related to the theme, developed mainly by the Autonomous University of Barcelona and the Barcelona Public Health Agency. Additionally, exploratory interviews were conducted with professionals, professors and experts in the field, followed by an exploratory data analysis with the objective of identifying organizations, institutions and public departments that could have quantitative data related to food security.

As a result of this exploratory phase, the following gaps were identified in the context in which the research was conducted:

- i. The lack of a local definition of food security, either by the Catalan government or by the Barcelona Public Health Agency;

- ii. The predominance of academic research on food security with a qualitative approach;
- iii. The lack of justification for this type of research with quantitative support;
- iv. The lack of food security qualitative indicators;
- v. The lack of data production and statistics on the food insecurity issue by the government of Catalunya and Barcelona;
- vi. The invisibility of the theme in the Government public agenda.

## **3.2 Measurement**

### **3.2.1 Food security**

The concept of food security has evolved and diversified (Maxwell, 1996) and there are as many different definitions and measures of the phenomenon (Cafiero et al., 2014; Allen, 2013; Jones et al., 2013; Coates, 2013) as there are different types of surveys for its detection and indicators for its synthesis. In the last two decades alone, the complexity of the concept, compounded by the impossibility of observing food security outcomes directly (Barrett, 2010), led to a proliferation of indicators (Hoddinott, 1999; CFS 2011).

Each dimension of food security can be measured by different indicators or variables. These metrics can be extracted from data at national, regional, household and/or individual levels. Such tools can vary from simple indicators for which data can be quickly collected and easily analysed to comprehensive measures that require detailed data collection and resource-intensive and sophisticated analytical skills to produce results. Since food security is a multifaceted phenomenon and also the result of an achievement process, its dimensions are interdependent rather than merely additive. For that reason, a multidimensional assessment is suitable (De Haen, 2003; Heidhues and Von Braun, 2004; CFS, 2011), especially if performed in a timely manner.

The aim of this section, though, is not to discuss food security measurements, but rather to present the ones that, after a literature review, fit with the present research and its objectives. As we are focusing on the food access and utilization at the household and individual level, this section will present only the correspondent measurements based on recent literature and that are accepted by FAO, an important institution at the global level in regard to the food security discussion, mapping, and control.

Although food insecurity affects the population of low, middle and high-income countries differently, most of the recognized measurement methods do not vary and there are

a number of FAO-driven studies and research that supports the use of valid and comparable measurement methods capable of capturing food security magnitude, severity and causes. The establishment of official indicators was a major step for FAO, as it permitted that data could be generated to represent the complexity of food security at the national and the regional levels. In order to do so, there was a great effort to establish qualitative indicators -such as the Food Insecurity Experience Scale- from a common and validated framework of food security.

In general, food access has been commonly measured by calorie intake or an individual's dietary intake, by household incomes and by expenditure surveys. Food utilization, however, has usually been assessed through anthropometric indicators such as height, weight, Body Mass Index (BMI), stunting and wasting of children (Mahadevan and Hoang, 2016)<sup>4</sup>.

This research will analyse food security through the nutritional status of individuals. To do so, we are using the anthropometric indicator Body Mass Index, focusing on obesity and overweight. This variable was selected for two main reasons: the first one was because it is the only food security measurement method available in the database and the second was the strong correlation between food insecurity and malnutrition states; obesity and overweight (as explained in the literature review). Based on the weight and height declared in the interviews, the Body Mass Index (BMI) is calculated by dividing the weight of a person in kilos by the square of the person's height in meters ( $BMI = kg/m^2$ ).

The cut-off points for people over 18 years of age, according to the Health Survey of Catalunya, are the following: inferior weight when the BMI is less than 18,5; normal weight when the BMI is between 18,5 and 25; overweight when the BMI is equal to or greater than 25 and less than 30, and obesity when the BMI is equal to or greater than 30. Additionally, the excess weight of the population is determined by grouping the categories of overweight and obesity. Nonetheless, to this analysis, the BMI is divided in three categories: inferior and normal weight, overweight, and obesity.

### **3.2.2 Social exclusion**

Social exclusion, for this study, is defined as the impossibility or intense difficulty of accessing the mechanisms of personal development and socio-community insertion (Brugué et.al, 2002). This reality is configured from several spheres and factors of social exclusion that

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<sup>4</sup> Nevertheless, although anthropometry is often considered a proxy measure of food security's utilization dimension, it does have some limitations, since the nutritional status reflected in anthropometry is not influenced solely by food intake but also by one's hygiene and sanitation environment and access to care giving and health services (Jones et al., 2013).

interact with each other and impact people with different intensities and at different periods of life. To analyse social exclusion from this perspective, it is important to consider its multidimensionality and the various factors that compose it. Therefore, the selection of the social exclusion variables was made using these concepts explained in the literature review, and it attempted to include the concept's different spheres, according to what was presented in Table 1. Due to the lack of data to analyse the relational, housing and the communitarian-political spheres of social exclusion, and the low association previously verified between the available variables of the socio-sanitary sphere and the BMI<sup>5</sup>, the following spheres and their intensifying circumstances, as well as their respective variables, were analysed:

**I. The economic sphere of social exclusion** was analysed using the i) material deprivation indicator, ii) the difficulty of making ends meet and iii) the ability to cope with unexpected expenses variables. The material deprivation indicator refers to an index constructed from the inability to purchase or have certain items (Catalunya, 2017). These items include the lack of money and the forced lack of goods. This index contains three categories: severe material deprivation; material deprivation and no material deprivation. The population with severe material deprivation (indicator of Eurostat Europe 2020<sup>6</sup>) includes people who have conditions of life restricted by lack of resources and cannot afford at least four of the following items:

1. Avoiding debts (in mortgage or rent, utility bills or purchase instalments);
2. Keeping the home adequately warm;
3. Assuming unexpected expenses;
4. Having a meal with meat, chicken, fish or the vegetarian equivalent every other day;
5. Having a one-week annual holiday away from home;
6. Having a car;
7. Having a washing machine;
8. Having a colour television set;
9. Having a phone.

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<sup>5</sup> That did not discriminate sufficiently to be analyzed.

<sup>6</sup> Available at <<https://ec.europa.eu/eurostat/en/web/products-statistical-working-papers/-/KS-RA-12-018>>. Accessed on July 14 of 2019



The population with material deprivation is made of those who are deprived of at least one of the previous nine items<sup>7</sup>. The difficulty of making ends meet and the ability to cope with unexpected expenses are variables that represent the economic strains. And for this analysis are dummies variables that take the value 0 to indicate the absence of difficulty or ability to cope with unexpected expenses and 1 to indicate their presence. These variables and the material deprivation indicator are calculated by the Health Survey itself and are recognized by the statistical office of the European Union (Eurostat). They are also used by other relevant institutions in the studied territory, such as the Statistical Institute of Catalonia and the Barcelona Institute of Regional and Metropolitan Studies (IERMB) to measure living conditions and social exclusion.

**II. The occupational sphere of social exclusion** was analysed from the labour status. It is a categorical variable divided in 5 main categories: i) work; ii) study; iii) unemployment; iv) house and care work and v) others, a category that includes disability, old age or long-term illness, does not study or work or other possibilities.

**III. The formative sphere of social exclusion** was analysed from the maximum level of studies, in order to represent the academic and intellectual capital. This variable is distributed in the following categories: without studies or with primary education; secondary education and university studies.

**IV. The intensifying circumstances of social exclusion** were represented by demographic variables such as gender (a dummy variable), age (a numerical variable) and nationality (a categorical variable). Nationality is divided in 3 categories: foreigner, Spanish, and Spanish and others (that is, those who have dual citizenship).

### **3.3 Method of Data Analysis**

The statistical analyses were performed using R software, version 3.6, at the operating system Ubuntu 18.04. First of all, descriptive univariate statistics were performed for the total sample. Secondly, a bivariate analysis was calculated to investigate the relationship between

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<sup>7</sup> Available in the methodology of the Social Living Survey of the Catalunya Institute of Statistics: <<http://www.idescat.cat/pub/?id=ecv&n=7830&m=m#a5>>. Accessed on July 14 of 2019

food insecurity and social exclusion. As previously mentioned, food insecurity is analysed through nutritional status, measured by the BMI. Therefore, the BMI was used as a dependent variable and the social exclusion variables as independent variables. Regarding the intensifying circumstances, the behaviour of three variables was analysed.

## 4. Results

This section presents the results obtained by data analysis and proposes a dialogue between the findings and the literature review. Therefore, the section is organized in two parts: the first one refers to the univariate analysis and the second one in the presentation and interpretation of the results obtained by bivariate analysis.

### 4.1 Univariate analysis

Table 2 provides a description of the study sample, regarding the dependent variable and the main social exclusion variables. Through this descriptive analysis, we can obtain data about the food insecurity dimension and the profile and characteristics of the sample individuals, information that will be useful for the analysis of social exclusion later on. Of the 3.755 individuals in the sample, more than 30% were considered overweight, 12.5% were considered obese, and 56.2% were normal or underweight. The obesity and overweight rates are slightly lower than Catalunya's rates. According to the Health Department, half of the population aged 18 to 74 is overweight (which in this case corresponds to the sum of overweight and obesity rates)<sup>8</sup>.

Almost 40% of the study sample had difficulties to reach the end of the month; 29.5% were considered to be materially deprived, 5.6% were considered to have severe material deprivation and 64.9% were considered not to have any material deprivation. In addition, 74.1% were able to cope with unexpected expenses, but 25.9% were not.

According to the Statistical Institute of Catalunya (Idescat), in 2017, 49.7% of the population in Catalunya had difficulties to reach the end of the month; 43.4% of the population had material deprivation, 5% were considered to be severely deprived and 31.9% could not

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<sup>8</sup>According to the Health Survey of Catalunya from 2017, available at [http://salutweb.gencat.cat/ca/el\\_departament/estadistiques\\_sanitaries/enquestes/esca/resultats\\_enquesta\\_salut\\_catalunya/](http://salutweb.gencat.cat/ca/el_departament/estadistiques_sanitaries/enquestes/esca/resultats_enquesta_salut_catalunya/). Access on 28 of August of 2019.

cope with unexpected expenses<sup>9</sup>. Comparatively these rates are higher than the rates of the studied sample in the Metropolitan Area of Barcelona, although in both territories the rates are significant and demonstrate situations or possible risks of social exclusion.

Table 2. Descriptive Statistics for food insecurity and the main social exclusion variables from a sample of the Health Survey of Catalunya (2015-2017) for Adults between 18 years to 60 years.

TOTAL (N = 3755)	Specific values and items	% TOTAL
<b>Body Mass Index</b>		
Normal and inferior weight	BMI below 24.9	56.2
Obesity	BMI of 25-29.9	12.5
Overweight	BMI of 30 or greater	31.2
<b>Difficulty in making ends meet</b>		
With difficulty	Households have difficulty to reach the end of the month	38.6
Without difficulty	Households do not have difficulty to reach the end of the month	61.4
<b>Material deprivation</b>		
Severe material deprivation	Unable to afford at least four of the nine items <sup>10</sup>	5.6
With material deprivation	Unable to afford at least one of the nine items	29.5
Without material deprivation	Able to afford all items	64.9
<b>Ability to cope with unexpected expenses</b>		
Yes	Households can cope with an unexpected expense of € 750 with their own resources	74.1
No	Households cannot cope with an unexpected expense of € 750 with their own resources	25.9

<sup>9</sup> According to the Living Conditions Survey from 2017, available at <<https://www.idescat.cat/pub/?id=ecv&lang=es>>. Access on 28 of August of 2019.

<sup>10</sup> As mentioned previously, these items are: 1. Avoiding debt (in mortgage or rent, utility bills or purchase installments); 2. Keeping the home adequately warm; 3. Assuming unexpected expenses; 4. Having a meal with meat, chicken, fish or vegetarian equivalent every other day; 5. Having one-week annual holiday away from home; 6. Having a car; 7. Having a washing machine; 8. Having a color television set; 9. Having a phone.

## **4.2 Bivariate analysis**

This section will present and examine the results obtained through bivariate analysis. It is important to note that, although the nutritional status of food security was analysed through the BMI categories of obesity and overweight, which are pre-established cut-off-points, we did not establish specific categories for the other variables analysed. Based on social exclusion theories and on the theme's dynamic, multidimensional and multifactorial characteristics, the present analysis considers different spheres and factors of social exclusion that can result in the impossibility or intense difficulty of accessing the mechanisms of personal development and socio-community insertion. Albeit it does not establish a static and fixed situation within each social exclusion variable, it does indicate from theory what is being considered as a social exclusion generator factor in our current society - with the exception of variables in the economic sphere, where there is already a predefined population considered to be socially excluded, as mentioned in the methodology section.

To better understand the contents and concepts that will be covered in this section, it is important to explain the logic and relationships established from the food security theory that guided the present analysis. As previously mentioned, this research analyses the dimensions of food security access and utilization. In order to do so, the analysis focuses on the nutritional states of overweight and obesity that can be a result of food insecurity situations.

While statistically analysing overweight and obesity and their relationships with social exclusion variables, other aspects and elements of food insecurity dimensions are also explored. Ergo, in addition to the relationship between the BMI (food utilization indicator) and a determined social exclusion variable, we analyse other aspects of the utilization or of the access dimensions that may be associated with the phenomena -such as food consumption and preparation-, making explicit the existing interrelationships. This is done to provide a completer and more corresponding picture of the multidimensional characteristics of food security.

### **4.2.1 BMI and the economic sphere of social exclusion**

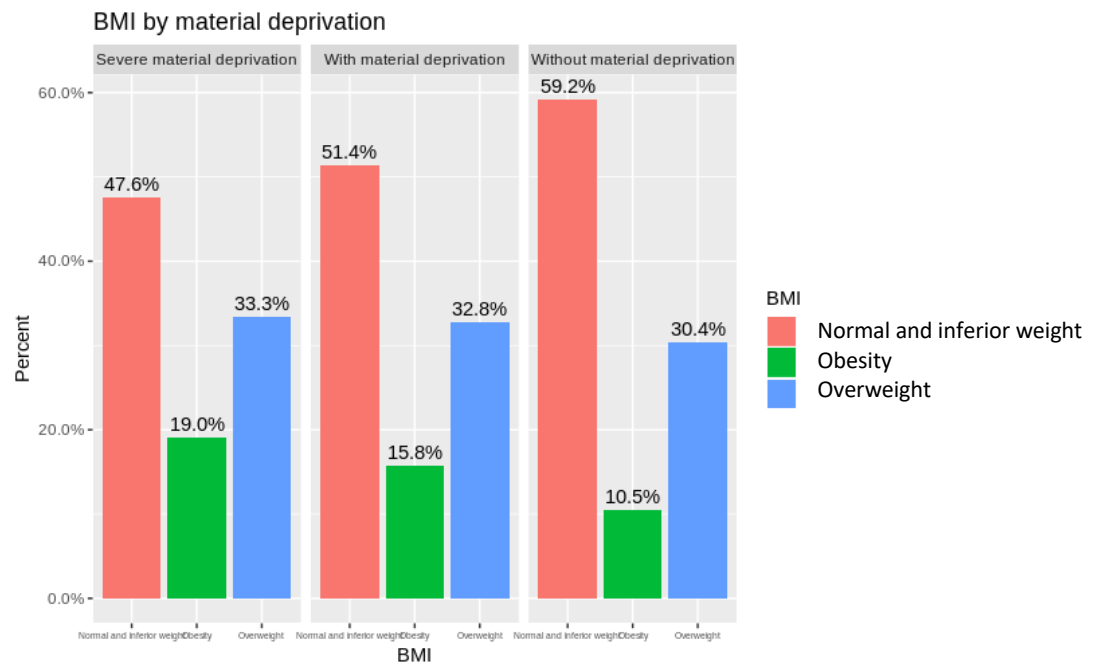
In the economic sphere, it is possible to distinguish essential factors of social exclusion: income poverty, material deprivation, economic strains and economic dependence on social benefits. These are complementary factors and demonstrate different intensities, moments or

aspects of social exclusion (Subirats et al., 2004). According to Eurostat, however, people at risk of poverty or social exclusion are in at least one of the following situations: at risk of poverty after social benefits; severely materially deprived or living in households with very low work intensity (Eurostat, 2017).

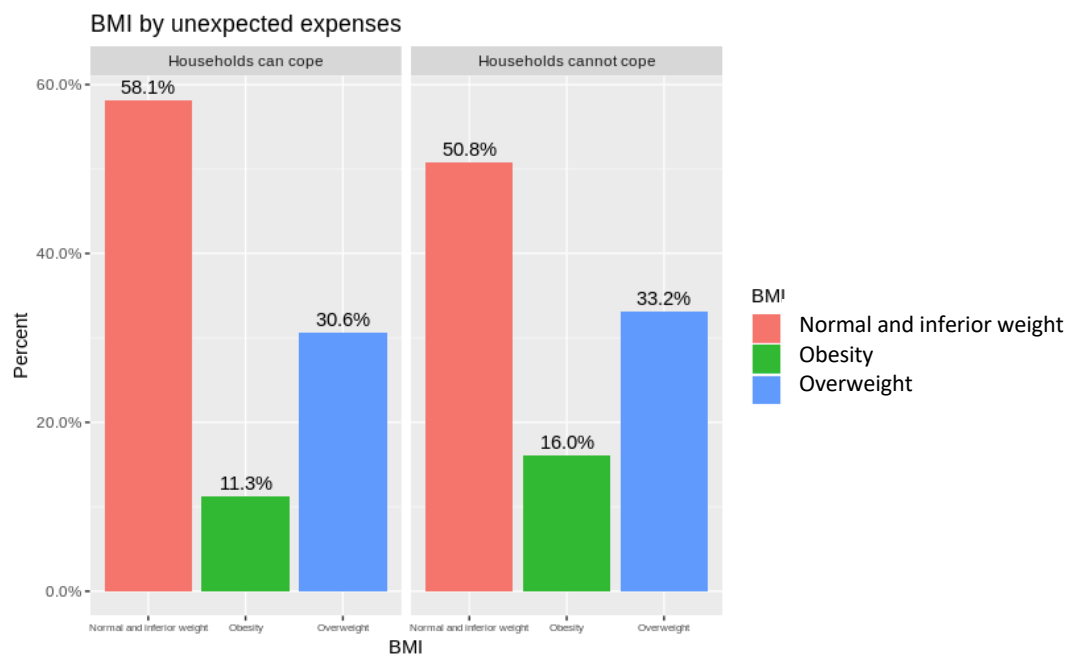
It is important to note that not all social exclusion derives from the lack of economic resources, though it is true that every person who suffers a situation of income poverty, material deprivation or economic strains has a higher possibility of falling into a spiral of risks and social deficits. The same applies to food insecurity, since the lack of economic resources do not determine it but may increase the risk of a person being in such a situation (Coates et al., 2003).

In the analysis carried out, it was observed that food insecurity affects populations in a situation of material deprivation or with economic strains; that is to say, people with severe material deprivation or material deprivation, with difficulties in reaching the end of the month or unable to cope with unexpected expenses, are those with the highest rates of overweight and obesity. Nevertheless, the overweight rates do not vary significantly in relation to populations that are not in a situation of material deprivation or economic strains. In the case of obesity, however, this variation is greater: there is approximately 10% of difference between the obesity rate of people who have severe material deprivation and those who do not have material deprivation. This suggests that there is a strong association between food insecurity and material deprivation when analysing obesity. Additionally, this can also be observed when analysing the variables of difficulties to reach the end of the month and the ability to cope with unexpected expenses.

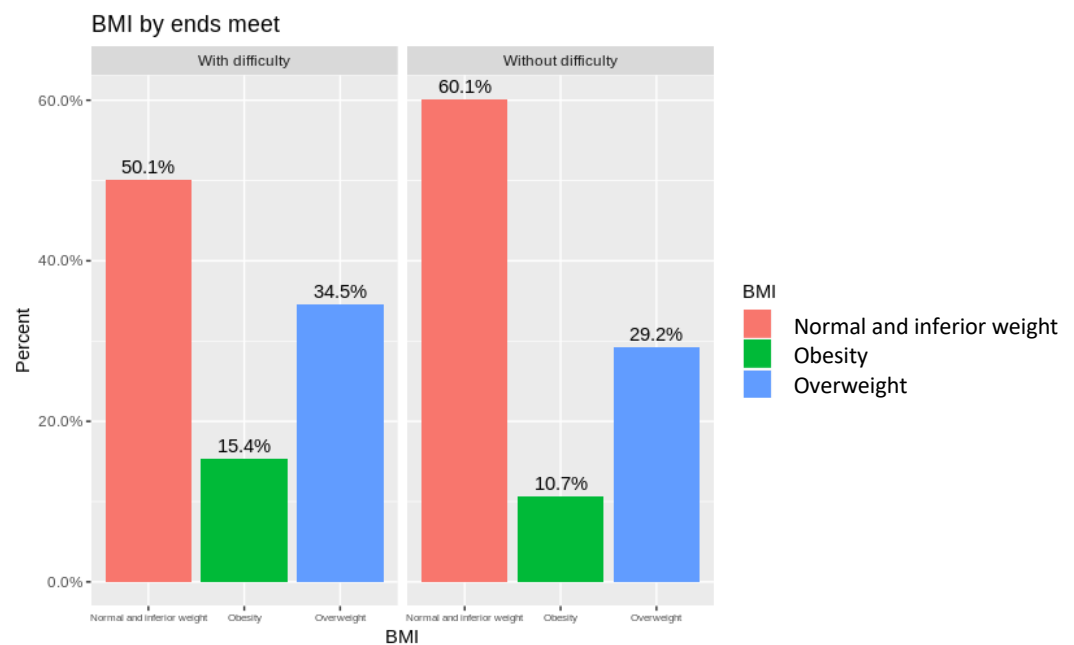
Graph 1. Percentage of BMI status by material deprivation



Graph 2. Percentage of BMI status by ability to cope with unexpected expenses



Graph 3. Percentage of BMI status by making ends meet



#### 4.2.2 BMI and the occupational sphere of social exclusion

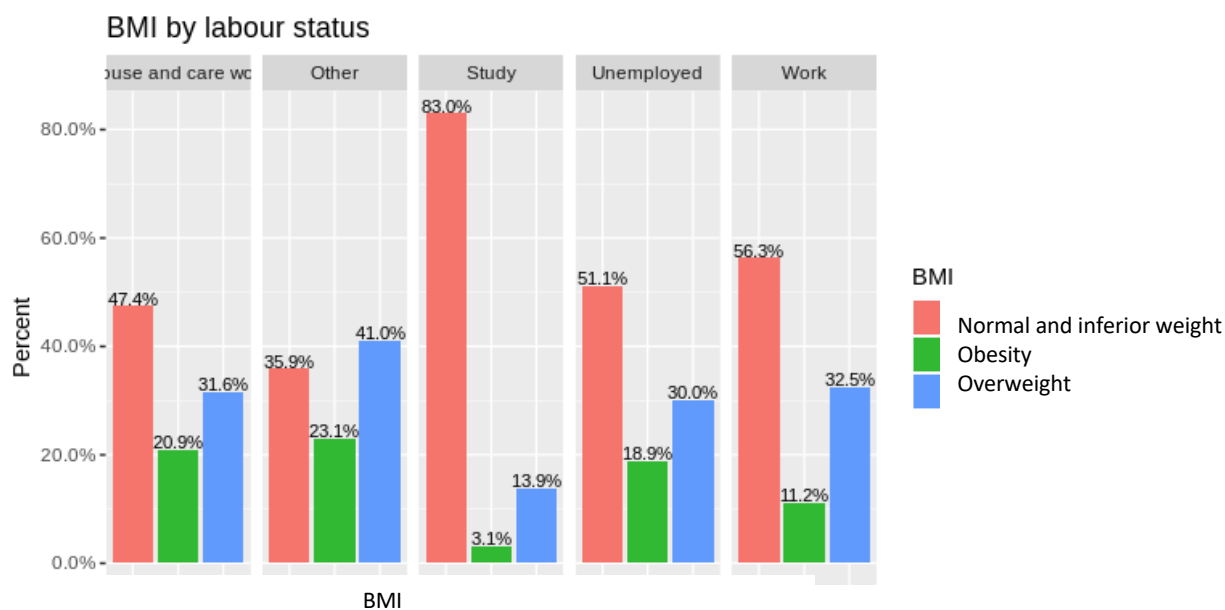
Before we deepen our analysis of the social exclusion factors that operate in this sphere, it is essential to explain the research's adopted concept of occupation. Besides strictly capitalist forms that work adopts (Subirats et al., 2004), unpaid house and care work and family help have been included. It is equally important to mention that work, in addition to being a basic source of income and, therefore, a means of subsistence, also constitutes a social relational mechanism. Hence, unemployment and precarious working conditions - whether paid or unpaid - can have effects in terms of social exclusion, which go beyond economic issues (Subirats et al., 2004).

Social exclusion in the occupational sphere is associated with two conditions. On the one hand, we have exclusion from the labour market; on the other, exclusion within the labour market, which is reflected in the precariousness of employment and the poor working conditions (Brugué, et al., 2002). Both exclusions can affect food security in two dimensions. First, in the physical and economic access, since, according to the income, time and displacement necessary to acquire food, its quantity and quality can vary. Secondly, in the use of food, due to the time available for its preparation and consumption.

This study focused on exclusion from the labour market. It was able to identify that the population that is outside the labour market - represented by those with disabilities, the elderly, those with long-term illnesses, or those who are not studying or working, amongst other

possibilities - is the one most likely to be overweight or suffering from obesity. The unemployed population is also affected by food insecurity: 30% of unemployed people are overweight and 18.9% obese. However, being overweight and obese is not something that only affects these groups; it is also present in those who work or take care of house and care work. As can be seen in the graph below, high rates of overweight and/or obesity are present in all categories of occupation analysed, except the student population. This, along with the low percentage variation between the rates of these nutritional states in the different occupational categories - mainly in the case of those who are overweight -, does not allow this analysis to establish a direct link between occupation and food insecurity.

Graph 4. Percentage of BMI status by labour status



#### 4.2.3 BMI and the formative sphere of social exclusion

In today's society, formative education and training has a key role in social exclusion, due to its ability to provide professional skills and to promote personal and social development, especially when knowledge and information are essential in the productive and social space (Subirats et al., 2004). In this subject, the following factors can be identified as exclusion factors: illiteracy, low educational levels, school failure, premature abandonment of the educational system and lack of knowledge of the language.

In the analysis carried out, it was observed that low educational levels can also affect food insecurity: the population most affected by weight issues and obesity is the one with no education or only with primary education (36.6% for overweight and 20.1% for obesity).

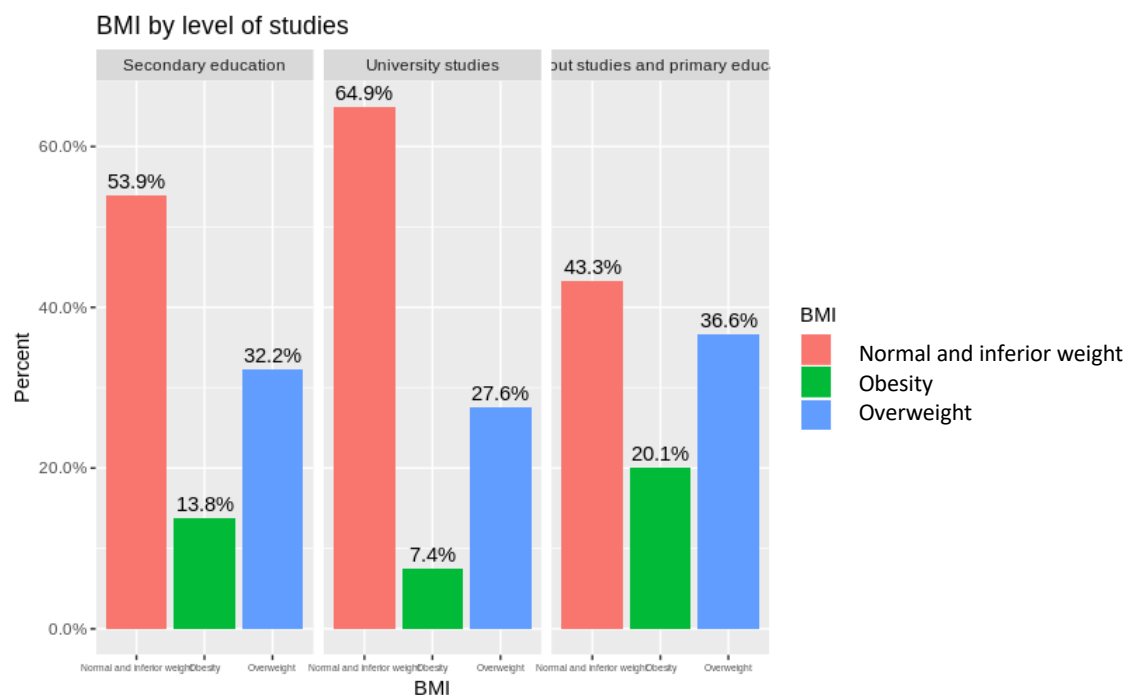


Furthermore, the obesity rates difference between the population with different levels of education is higher than the rate of overweight in the same categories.

This may be associated with food utilization knowledge, meaning that the nutritional knowledge and the skills people have and how they apply them at the time of buying, storing, preparing and consuming food can aggravate their food insecurity and nutritional status. It is important to mention that food and nutritional knowledge is not only limited by levels of education, but also related to traditional and cultural knowledge that does not depend on the latter. To measure the impact of this knowledge, more information would be necessary.

In addition, it is also essential to underline the multidimensional and multifactorial nature of social exclusion, which implies that its spheres and factors are related and can influence individuals simultaneously, hence the fact that excluded populations at the formative level are usually also in a situation of risk of exclusion in the economic and labour spheres. If we presume this limitation of economic resources, the access dimension - which was not contemplated in this section, but which is also associated with food security - could affect this analysis.

Graph 5. Percentage of BMI status by level of studies

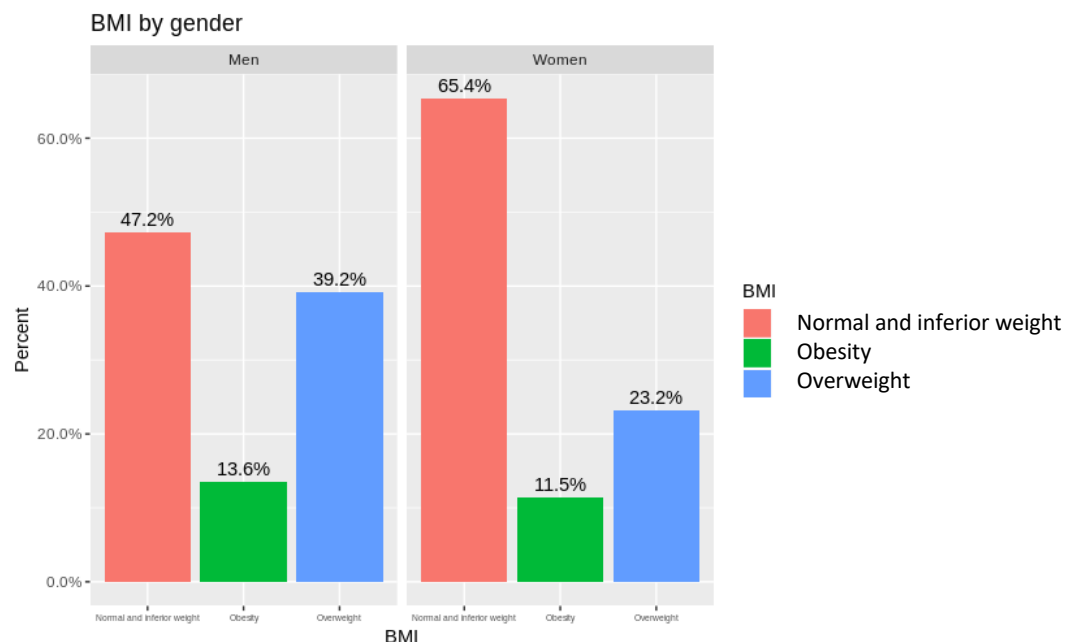


## 4.2.4 BMI and the intensifying circumstances of social exclusion

### BMI and Gender

Although gender is considered as an intensifying circumstance of social exclusion and food insecurity - there are several studies that show how women are more prone to food insecurity (Brunelli and Viviani, 2014; Nord, 2011) - the results of this study show another situation. In the case of the study sample, both the population of overweight men (corresponding to 39.2%) and the population of men with obesity (13.6%) are greater than the population of women in these situations (23.2% and 11.5%, respectively). It is important to mention, though, that, regarding obesity, the difference in percentages between men and women is very low (2.1%). This data relates to recent research data on food insecurity, which shows how obesity is more concentrated in women, both in high-income and medium or low-income countries (WHO, 2018).

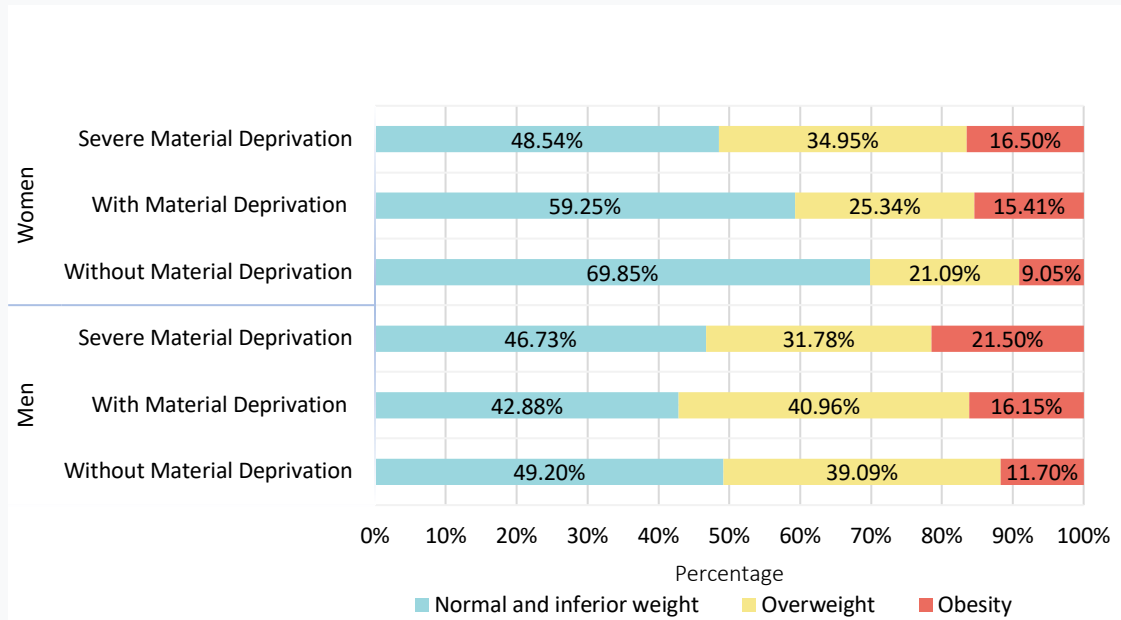
Graph. 6 Percentage of BMI status by gender



Additionally, when analysing the impact of gender in the relation of social exclusion factors and BMI, this study shows that men are more affected by material deprivation and by overweight than women. More than 40% of men are materially deprived and overweight, while 25% of women are in this situation. Additionally, gender does not seem to impact on the relationship between material deprivation and obesity, which can be verified by the low variation between the percentages. The analysis also shows that comparatively, the percentage

of men who have difficulties to reach the end of the month and who are overweight (38.21%) or obese (11.96%) is higher than the percentage of women in the same situations (20.12% and 9.45%). This difference between how men and women are affected also appears regarding the ability to cope with unexpected expenses, where 38% of those who cannot cope with unexpected expenses and are overweight are men, and 28.21% are women.

Graph 7. Material Deprivation Impacts Food Insecurity and is intensified by gender

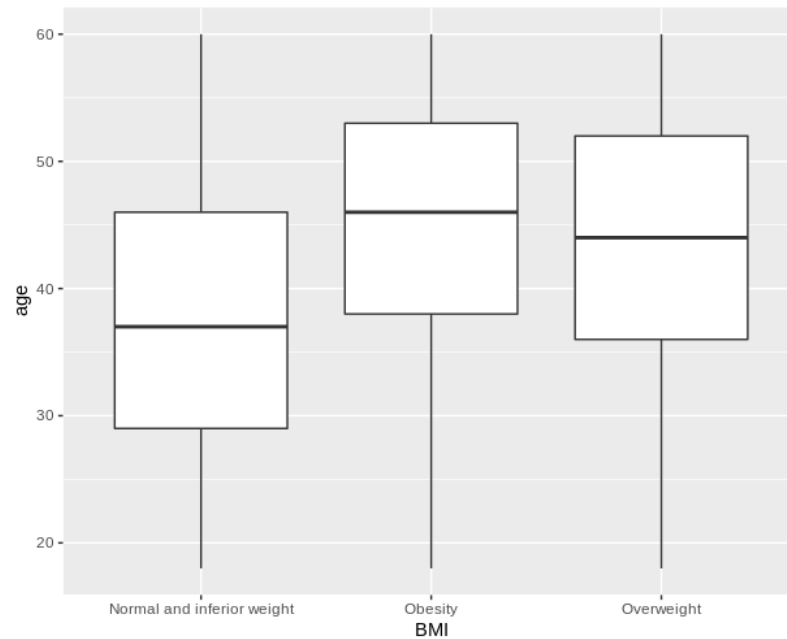


### BMI and Age

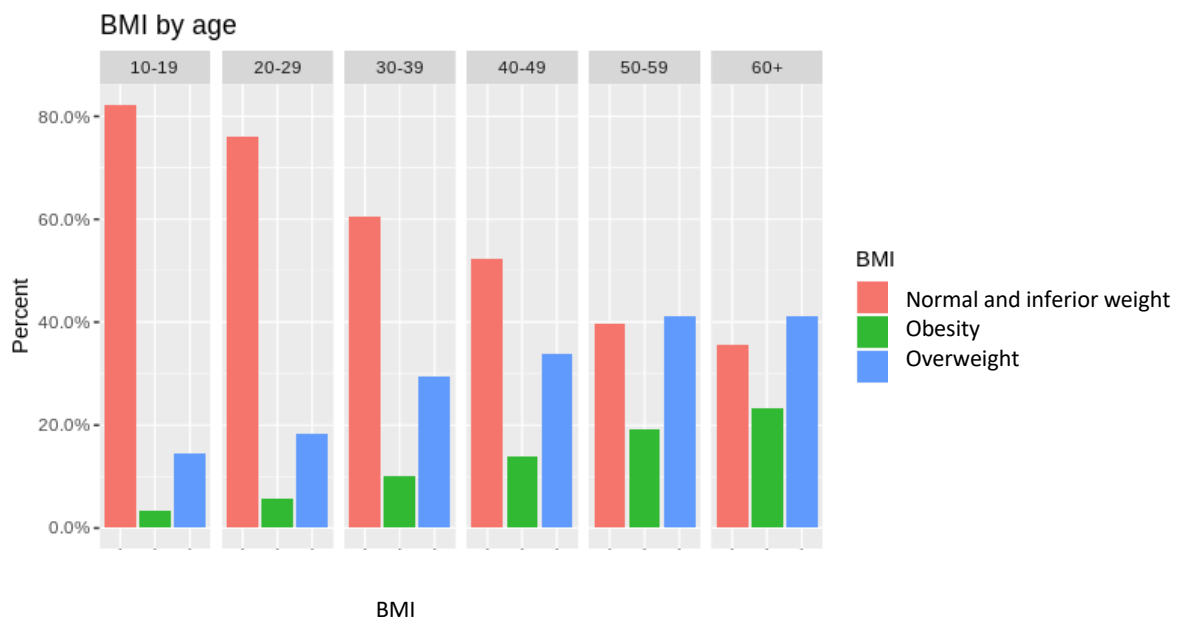
Age affects all spheres of social exclusion in a transversal way, and therefore is considered to be an intensifying circumstance, as each vital stage is linked to specific situations that can intensify social exclusion trajectories. Even so, old age is closely related to increasing disease and worsening health status, and food insecurity is no exception. The data analysed in this study show how overweight and obesity rates increase progressively depending on the individual's age.

This trend may be related to the two analysed dimensions of food security: access and utilization. Economic and physical access can be perceived possibly due to physical activity levels, mobility limitations or to the lack of time to acquire food in terms of quantity and quality: 72% of the adult population from the study sample is currently working, which may affect their available time and the displacement to access food. Utilization, on the other hand, is noted in terms of dietary adequacy, nutrient absorption and ability to store and prepare food.

Figure 1. Mean differences between age and the BMI status (95% confidence intervals).



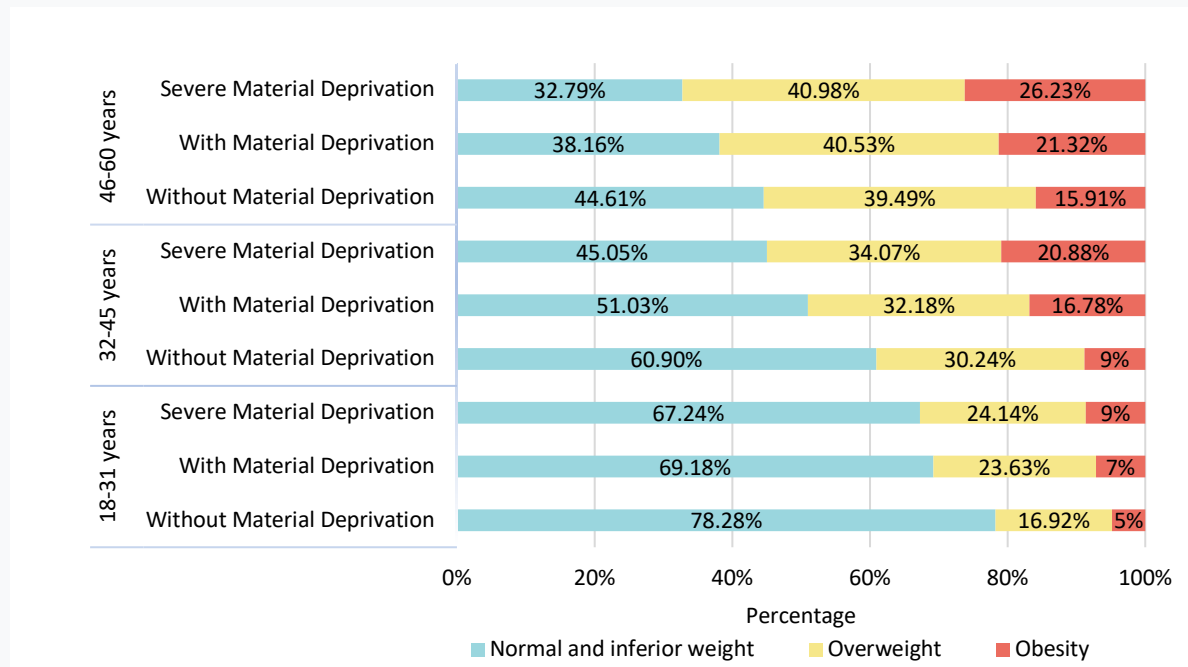
Graph 8. Percentage of BMI status by groups of age



In addition to these considerations, the analysis of how age impacts the relationship between social exclusion factors and the BMI supports what was previously exposed. It reveals that older people are more affected by material deprivation, economic strains, overweight and obesity than younger people. Comparatively, the percentage of people aged 46 to 60 years old who have material deprivation or severe material deprivation and are obese or overweight is

greater than the percentage of people between 18 and 31 years old in the same situations (these percentages vary more than 15% when comparing the respective categories of material deprivation and BMI<sup>11</sup>). This percentage difference can also be observed in relation to the groups from 46 to 60 years and 32 to 45, but with a lower variation (between 5 and 8% of difference).

Graph 9. Material Deprivation Impacts Food Insecurity and is intensified by age



Furthermore, the age also impacts in the relationship between economic strains and food insecurity: the highest rates of those who have difficulties to reach the end of the month and overweight are in the age group between 46 to 60 years old (corresponding to 38.7%, while the percentage of the 32-45 age group is 28.5% and of the 18-31 age group is 17.3%). The same can be observed for obesity. Lastly, the highest percentage of inability to cope with unexpected expenses and overweight is also in the age group between 46 to 60 years old, corresponding to 42.8%, while the percentage of the other groups corresponds to 32.8% (people between 32-45 years) and 22.35% (people between 18-31 years). Regarding the inability to cope with unexpected expenses and obesity, the rates correspond to 7.2% for the 18-31 age group, 16.92% for the 32-45 age group and 22.40% for the 46-60 age group.

<sup>11</sup> These categories are: material deprivation and overweight; material deprivation and obesity; severe material deprivation and overweight; severe material deprivation and obesity.

## **BMI and Nationality**

Ethnicity and / or origin, as well as nationality, operate as circumstances that intensify the risk of social exclusion. When analysing food security, nationality is important in regard to eating habits, both in terms of food use and preparation, as well as food consumption. By being in a country other than the country of origin, food security of individuals and households may be affected by poor social acceptance of eating habits and preferences, as well as by the reduced availability of foods that are traditionally consumed. Consequently, these changes in food consumption and food diet can have a positive or negative impact on nutritional states.

Despite this understanding, the data analysis does not seem to show a direct or relevant connection between the individuals' origin and their nutritional status, since the percentages of the population who are overweight or obese do not show significant differences when distributed in categories linked to nationalities. More specifically, the percentages for overweight populations in the categories analysed (Spanish nationality, Spanish and other, and foreigner) range from 30% to 36%. Regarding obesity, this rate ranges from 11.5% to 12.7%. These results may be related to the fact that in the study sample only 3.2% of the population analysed were from other nationalities.

## **5. Discussion**

Given the purpose of this research and the analysis performed, it was possible to obtain empirical results on the current situation of food insecurity in the Metropolitan Area of Barcelona and its relationship with social exclusion. This section will therefore focus on discussing these findings.

Food security is composed of four dimensions: availability, access, utilization and stability. The dimension of access at the individual and household level is directly related to socioeconomic aspects, such as the economic and physical access to food and the social acceptance when purchasing or consuming food. In this sense, having restricted access to food in sufficient quantity and/or quality in order to maintain adequate nutrition and health implies food and nutritional insecurity. From the definition of social exclusion used by this study - defined as the impossibility or intense difficulty of accessing the mechanisms of personal development and socio-community insertion (Brugué et al., 2002)- not having access to food

or having restricted access to them can be considered a factor – and simultaneously a consequence- of social exclusion<sup>12</sup>.

Regarding food utilization, individual characteristics such as age, gender, health status, physical activity levels, among others, are elements that influence one's ability to convert the food acquired into nutrition and, therefore, affect a safe state in food and nutrition. These elements, specifically age, gender and health status, are also considered intensifying circumstances and factors of social exclusion (Brugué et al., 2002). Additionally, other elements that are not directly associated with food but also impact food utilization, such as sanitary and health conditions, education levels and nutritional knowledge, also relate to the socio-sanitary sphere of social exclusion.

All of these elements can be considered critical for promoting food security and, especially, in a broader perspective related to the current context of social insecurities and vulnerabilities in Western Europe, for promoting social inclusion dynamics. The present analysis sought to empirically verify the relationship between food insecurity and social exclusion in the metropolitan area of Barcelona. In order to do so, it analysed the nutritional status of overweight and obese populations and its relationship with variables of the following social exclusion spheres: economic, occupational, formative and, finally, situations that can be considered intensifying circumstances.

The results show that food insecurity and social exclusion factors are more related in the economic and formative spheres. In this context, the groups most affected by overweight and obesity are those with material or severe material deprivation, difficulties to reach the end of month, unable to cope with unexpected expenses and with a low level of studies (corresponding to a total of 36.6% who are overweight and 20.1% with obesity). In addition, economic factors seem to impact more on obesity.

Regarding the occupational sphere, it was observed that people with advanced age, long-term diseases, functional disabilities or others have the highest overweight and obesity rates (41% and 23.1%, respectively). This leads therefore, to a link between a group that may be socially excluded due to present characteristics (age and functional disability, for example) and food insecurity. Even so, comparatively the low variations between other rates of overweight and obesity in different occupational categories do not allow us to affirm an important relationship between both themes.

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<sup>12</sup> Given the implications of food insecurity on people's nutritional status and well-being.

Additionally, the study verified that food insecurity increases with age and also that age impact on the relationship between material deprivation and food insecurity, as well as in economic strains and food insecurity. In this sense, the highest rates of those who were in a situation of material deprivation, with difficulties to reach the end of month, unable to cope with unexpected expenses and were obese or overweight were found in the age group between 46 and 60 years.

The nationality and gender analysis in this study found that, although these two factors are considered as intensifying circumstances of social exclusion, they do not appear to impact or intensify food insecurity. This is because being from another country or being a woman are not factors directly associated with a higher rate of overweight or obesity. In fact, the percentages of overweight and obesity are very similar in the different nationality categories analysed. Regarding gender, however, unlike what other food security studies indicate, men are the ones most affected by overweight and obesity (39.22% being classified as overweight and 13.6% as obese). Additionally, when analysing the impact of gender in the relation of social exclusion factors and BMI, more than 40% of men are materially deprived and overweight, while 25% of women are in this situation. The analysis also shows that comparatively, the percentage of men who have difficulties to reach the end of the month and who are overweight (38.21%) or obese (11.96%) is higher than the percentage of women in the same situations (20.12% and 9.45%). This difference between how men and women are affected also appears regarding the ability to cope with unexpected expenses, where 38% of those who cannot cope with unexpected expenses and are overweight are men, and 28.21% are women.

Another interesting aspect shown by this study refers to how overweight and obesity affect the analysed groups differently. Although the groups most affected by overweight and obesity problems were the ones considered to be in risk of social exclusion – when compared to the other groups to a greater or lesser extent -, the difference between overweight rates was less than the difference between obesity rates. This was ascertained mainly in the formative and economic sphere variables, suggesting that the impact of social exclusion factors on food insecurity may be stronger in relation to obesity than in relation to the overweight category.

Throughout the analysis, some questions and considerations emerged regarding the topics that were addressed, as well as study limitations (linked to the theme and the missing data at the neighbourhood level) and future research developments.

In general, the results show us the complexity of both themes and the difficulty of defining not only their relationships, but also the situations and experiences of food insecurity



and social exclusion. By addressing two themes that have multidimensional and multifactorial characteristics, barriers were found when defining and limiting the action of each factor and dimension. Also, there were difficulties in operationalizing the phenomena as well as in establishing causal links.

## 6. Conclusions

In a context of change and new social risks, industrial society's former linearity and stability can no longer be found. They were replaced by the dynamism and fluidity of social relations and processes produced by a liquid, risky and knowledgeable society (Gomà, 2018). Capturing and understanding social issues has also become much more complex, making so that commonly used indicators and data are no longer necessarily able to measure and provide information about the current reality.

As previously mentioned, social exclusion is composed of different spheres and factors, elements that affect people with different intensities in different moments (Brugué et al., 2002) and can, therefore, lead to different situations. One of this research's limitations is directly related to this dynamic, since the available data was not enough to provide an analysis of the various dimensions and factors that make up a social exclusion situation. In particular, the lack of data at the neighbourhood level did not make it possible to analyse the spatial dimension of food security, what is considered as a limitation of the study and intended to be done in a future doctoral dissertation. Within this context, it would also be interesting to have more data available on economic insecurities. For the analysis proposed by this research, the only available variables in the database that could represent the economic sphere of social exclusion were material deprivation and economic strains. Economic insecurity, however, clearly differs from methods of measuring economic poverty and multiple material deprivation, and as pointed by some studies, is better suited to the European social context (Ranci et al., 2017).

Regarding food security as a multidimensional phenomenon and a process of achievement; its dimensions and aspects are, ergo, interdependent and not merely addable. For this reason, the present analysis sought to explore different aspects of food access and food utilization without establishing an order or hierarchy between them. Since BMI was used to represent nutritional status with predefined categories of overweight and obesity, individuals at risk of food insecurity were not considered. In addition, other aspects present in the experience of being food insecure, such as the uncertainty or the consequent anxiety produced by the difficulty to access, use or consume food, were not analysed, but may have affected the

analysis indirectly. In order to properly understand all these dimensions, factors and components, it would be more appropriate to use qualitative indicators such as the Food Insecurity Experience Scale (FIES)<sup>13</sup>.

Furthermore, this study reaffirms the need to incorporate other dimensions of social exclusion, especially the spatial one due the increasingly spatial configuration of social issues and the impact it can have on food security. For this, it is recommended the use of quantitative and cartographic methods, capable of analyse geographic data and which can provide information about the spatial dimension.

Moreover, this study highlights the importance of incorporating qualitative methods in the food security and social exclusion analysis, in order to explore local factors and aspects such as social capital, social innovation initiatives, and local public policies. Extend the discussion beyond the descriptive analysis of the phenomenon and try to map its possible causes related to the local sphere is considered as necessary to offer insights for future public policies or interventions focused on groups that are subject to different social exclusion and food insecurity dynamics.

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<sup>13</sup> One of the methods that FAO uses to control food security on a global scale, which is considered most appropriate because it is experience-base

## 6. References

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## 7. Appendix

Table 1. Difficulty in making ends meet, BMI and gender

<b>Making ends meet</b>	<b>Normal and inferior weight</b>	<b>Overweight</b>	<b>Obesity</b>
<b>Men</b>			
With Difficulty	49.83%	38.21%	11.96%
Without Difficulty	43.13%	40.82%	16.05%
<b>Women</b>			
With Difficulty	70.42%	20.12%	9.45%
Without Difficulty	57.22%	28.05%	14.73%

Table 2. Ability to cope with unexpected expenses, BMI and gender

<b>Unexpected expenses</b>	<b>Normal and inferior weight</b>	<b>Overweight</b>	<b>Obesity</b>
<b>Men</b>			
Can Cope	47.89%	39.45%	12.66%
Cannot cope	45.18%	38.54%	16.27%
<b>Women</b>			
Can Cope	68.87%	21.27%	9.86%
Cannot cope	56.02%	28.21%	15.78%

Table 3. Material deprivation, BMI and age

<b>Material Deprivation</b>	<b>Normal and inferior weight</b>	<b>Overweight</b>	<b>Obesity</b>
<b>18-31 years</b>			
Without Material Deprivation	78.3%	16.9%	4.8%
With Material Deprivation	69.2%	23.6%	7.2%
Severe Material Deprivation	67.2%	24.1%	8.6%
<b>32-45 years</b>			
Without Material Deprivation	60.9%	30.2%	8.9%
With Material Deprivation	51.0%	32.2%	16.8%
Severe Material Deprivation	45.1%	34.1%	20.9%
<b>46-60 years</b>			
Without Material Deprivation	44.6%	39.5%	15.9%
With Material Deprivation	38.2%	40.5%	21.3%
Severe Material Deprivation	32.8%	41.0%	26.2%

Table 4. Difficulty in making ends meet, BMI and age

<b>Making ends meet</b>	<b>Normal and inferior weight</b>	<b>Overweight</b>	<b>Obesity</b>
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<b>18-31 years</b>			
With difficulty	77.89%	17.33%	4.79%
Without Difficulty	69.45%	23.05%	7.49%
<b>32-45 years</b>			
With difficulty	61.78%	28.52%	9.70%
Without Difficulty	49.57%	34.96%	15.48%
<b>46-60 years</b>			
With difficulty	45.09%	38.70%	16.22%
Without Difficulty	37.83%	41.63%	20.53%

Table 5. Ability to cope with unexpected expenses, BMI and age

<b>Unexpected expenses</b>	<b>Normal and inferior weight</b>	<b>Overweight</b>	<b>Obesity</b>
<b>18-31 years</b>			
Can cope	76.49%	18.29%	5.22%
Cannot cope	70.45%	22.35%	7.20%
<b>32-45 years</b>			
Can cope	59.53%	30.38%	10.09%
Cannot cope	50.25%	32.84%	16.92%
<b>46-60 years</b>			
Can cope	44.48%	38.95%	16.57%
Cannot cope	34.74%	42.86%	22.40%