

## **Quality of Life and Habitability Conditions in Peri-urban areas of Southern Mar del Plata, Argentina: A Multimethod Study**

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## Abstract

Peri-urban areas in Latin America exhibit significant social and environmental problems that affect the quality of life of their inhabitants. Based on previous studies, this paper aims to evaluate the quality of life in the peri-urban area of southern Mar del Plata, Argentine Republic, from a multimethod approach. A synthetic index was constructed based on the concept of habitability, which is directly linked to the notion of quality of life, and integrates six dimensions (health, housing, accessibility, education, economy, and environment). Indicators were obtained mainly from the last national censuses (2001-2010). Subsequently, semi-structured interviews (2015-2016) were conducted in the areas affected by the most critical habitability conditions identified by the index in order to deepen the perception and appreciation of the individuals' experience about their quality of life. The results obtained reveal unequal access to infrastructure, services, equipment, adequate housing, and urban land, among others, especially noticed between the coastal and inland sectors. The methodological procedure adopted allowed to complement and enlighten some objective and subjective aspects of the quality of life of peri-urban areas, providing the basis for the urban management of the study area.

**Keywords:** quality of life; social sustainability; unequal access; peri-urban neighborhoods; habitability indicators.

## 1. Introduction

Latin America and the Caribbean are considered the most urbanized regions in the world with almost 80% of their population currently residing in cities. However, in their growth, urban areas exhibit a general environmental degradation process and profound social inequality (UN-Habitat 2012). In general, the peri-urban areas of cities address profound social and environmental issues which affect the quality of life of their inhabitants.

The concept of quality of life has considerably evolved in recent decades, and its own nature makes it difficult to agree on a single definition. Somarriba Arechavala and Zarzosa Espina (2016) postulate that the concept may be vague, complex, difficult to measure, multidisciplinary, dynamic and disperse.

Tonon (2008) argues that the concept of quality of life has come a long way before its reconceptualization, considering well-being not only as dependent on material issues but also on human values. In the historical review of the concept by Tonon (2008), the author points out that in 1998 the International Society for Quality of Life Studies elaborated a document after a discussion with pioneering experts on the subject and concluded that quality of life can be measured at subjective and objective levels.

Focusing on the objective level, Velázquez (2001) defines this concept as an achievement measure against an established level regarded as optimum, taking into consideration socio-economic and environmental dimensions that depend on the prevailing scale of values of the society, which vary in the light of historic progress expectations. In the same vein, Lucero (2008) claims that the quality of life comprises, in the first place, the material basis on which life unfolds. Secondly, it includes the natural and constructed environment where human beings live; and finally, all the relations that unfold from the

activities performed by individuals at work as well as other cultural and socio-economic relations.

Apart from the objective level, the concept comprises at least three subjective dimensions: social well-being (Estes 1999), subjective well-being (Diener 1984, Cummins 1998) and happiness (Veenhoven 2000). Casas (1996) conceptualizes quality of life as a function of the material and psychosocial environment, and proposes to deepen the knowledge of the material conditions of life and perceptions, evaluations and aspirations of individuals regarding their personal and social well-being. Tonon and Rodríguez de la Vega (2016) developed a model to measure the quality of life and forms of inequity that integrate different domains, through the incorporation of new non-traditional indicators with a regional perspective.

From a sustainable development approach, the concept of quality of life is directly linked to sustainability. Fernández et al. (1999), focusing on the sustainable urban development paradigm, refer to the concept of habitability to account for the social dimension of sustainability. Even though the concept of social sustainability is still open to different meanings (Moldan et al. 2012), in its broadest sense, this notion is related to the concept of personal and collective well-being, social cohesion, equity and the capacity of the population to sustain a system of values, identities, relationships and institutions that can be sustained over time.

The concept of habitability, connected to the social sphere of sustainability within the sustainable urban development paradigm, has several meanings some of which, according to Zulaica and Celemín (2008), refer exclusively to the sphere of housing while others go beyond the scope of this analysis to include individuals' satisfaction in certain scenarios or group of scenarios. Casals-Tres et al. (2013) analyze the different aspects of habitability by reviewing this notion from a sustainability perspective, as opposed to the traditional (and usually normative) view that centers on housing and materials.

From a similar perspective, Rueda (1997) proposes the concept of urban habitability based on four broad categories that are connected to the quality of life of the inhabitants and to cities sustainability: general well-being of the person, which entails his/her internal (spiritual and psychological) and external (his/her relationship with the remaining social group) well-being; environmental well-being, which refers to the harmonious relationship with the environment; psychosocial well-being, which implies individual satisfaction and; socio-political welfare, which has to do with social participation, personal and legal security.

As established in the United Nations Human Settlements Program (UN-HABITAT)<sup>1</sup>, ascribed by Argentina, habitability is related to the characteristics and qualities of the space, social context and the environment that give individuals a sense of personal and collective well-being. Aspirations to habitability vary from place to place, change and evolve over time and differ depending on the populations that are part of the communities. In this framework, habitability is an adaptation of the characteristics of the real situation and expectations, of the abilities and needs of the individuals as perceived by the individual and the social group (GIDES 2003).

Habitability accounts for the interrelationships between individuals and their environment (Moreno Olmos 2008). Hence, its knowledge allows progressing in the study of the quality of life. Tonon and Castro Solano (2012) sustain that the study of quality of life refers to the material environment (social well-being) and the psychosocial environment (psychological well-being). The latter is based on the experience and the

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<sup>1</sup> <http://www2.medioambiente.gov.ar/acuerdos/organismos/onu/Habitat/onuhpr1.htm>

evaluation that each person has of his/her situation, including positive and negative measures and a global view of the person's life. Habitability conditions the quality of life to the extent that the interactions between individuals and the environment make it possible or not to attain social and psychological well-being.

Placing emphasis on the relationship above, Moreno Olmos (2008) manifests that habitability is determined by the relationship and adequacy between human beings and their environment, and is considered as one of the factors that allows for the development of quality of life. In this way, the habitability conditions of the individuals determine their quality of life.

Mar del Plata city, located in the General Pueyrredon district (with 618,989 inhabitants, according to 2010 National Census), Argentina, has witnessed a significant growth in recent years, resulting in the formation of sparsely consolidated peri-urban space, facing profound socio-territorial issues that affect the quality of life of its inhabitants (Zulaica and Celemín 2008, Ferraro et al. 2013).

Previous studies have analyzed habitability conditions in the peri-urban area of Mar del Plata using quantitative indicators; (Zulaica 2013, Zulaica and Celemín 2014, Oriolani and Zulaica 2015, Zulaica and Ferraro 2016). Along these lines, this work intends to evaluate the quality of life of the peri-urban area of southern Mar del Plata from a multi-method approach. Tonon and Rodríguez de la Vega (2016) argue that in the last decades, there has been a tendency towards constructing indicators by regions in order to integrate economic, political, social and cultural aspects from quantitative and qualitative perspectives. In turn, Stimson and Marans (2011) point out that further studies should be conducted to prove empirically the links between subjective satisfaction with life in a given place and the objective characteristics of the urban region in which it is inserted. Based on this, this case study seeks to make a contribution in South America.

To meet this aim, the study departs from the concept of habitability to analyze in detail the objective and subjective dimensions of the quality of life in a South American city. Firstly, a quantitative approach is used to determine the critical areas of habitability in the southern peri-urban area of Mar del Plata (2001 y 2010). Then a qualitative view is proposed considering the perspective of the actors themselves about their quality of life. This is explained by the need to approach this dynamic space from heterogeneous realities that determine the current way of expansion of Latin American cities and capture the particularities and individual and collective interests of social actors that reconfigure the southern peri-urban sector.

Even though the studies above deal with the habitability conditions of the peri-urban areas that affect the quality of life, they provide approximations by using fundamentally quantitative tools. Consequently, a deeper analysis should be conducted including the analysis of problems, conflicts and tensions in the study area, through the inclusion of qualitative tools.

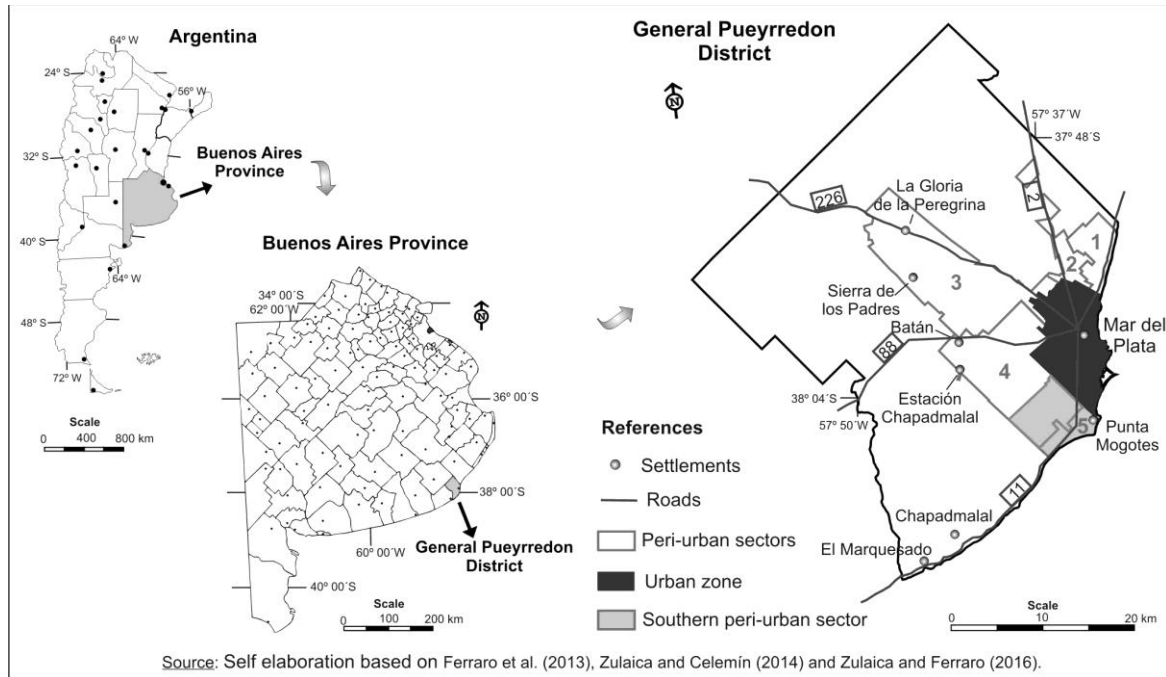
## **2. The Southern Peri-urban Area**

The peri-urban sector of Mar del Plata city totals 34,071 ha and, according to data from the last 2010 National Census of Population, Households and Housing by the National Institute of Statistics and Censuses (INDEC 2010), it had 125,143 inhabitants, i.e., 20.2% of the total registered population resided in the General Pueyrredon District in that year (Zulaica and Celemín 2014).

This urban-rural territory includes residential areas with residents of relatively high socio-economic status, marginal and heterogeneous areas facing severe social and

environmental problems, productive areas where intensive agricultural activities take place, and degraded areas affected by extractive (mining), industrial or waste disposal activities. When referring specifically to demographic growth in the peri-urban area, it reached 41.2% between 2001 and 2010, which represents a significantly greater growth than that of the district as a whole, which reached 9.7% in the same period.

Previous studies have differentiated sectors in the peri-urban area of Mar del Plata based on their ecological, physical, socioeconomic and environmental aspects (Ferraro et al. 2013). The study area includes part of sector 4 and sector 5 (Figure 1), which comprise the coastal and inland peri-urban area of Mar del Plata city.



**Figure 1.** Peri-urban sectors of Mar del Plata: location of the study area.

The southern peri-urban sector is characterized by strong demographic dynamics, which is reflected in a 63.2% growth rate according to the last intercensal period and by significant socio-territorial contrasts. The last National Census (INDEC, 2010) reported 27,889 inhabitants, i.e., 22.3% of the population lives in the peri-urban area. Most of the population resides in Faro Norte neighborhood, located at the intersection of Mario Bravo Avenue and the coast, which accounts for 17.5% of the population in the study area.

### 3. Methodological Procedure

The procedure used is based on a multimethod approach in order to optimize and enrich social phenomena and their investigation for a better understanding (De Sena 2015) of life quality in the southern peri-urban sector. The results obtained from this perspective were juxtaposed and complemented, providing a broad and rich vision of the objective of this study (Porcel López 2010).

To begin with, a synthetic index (Habitability Index, HI) was constructed to evaluate some objective aspects of the quality of life in the southern peri-urban area in 2010. The methodology used is based on partial results obtained from the area (Oriolani and Zulaica 2015), on previous investigations performed in the southern peri-urban sector of Mar del Plata (Zulaica 2013, Zulaica and Celemín 2008, Zulaica and Ferraro 2016) and on earlier

studies in which quality of life indexes were built (García and Velázquez 1999, Lucero et al. 2008, among others).

Six habitability dimensions affecting the quality of life of southern peri-urban inhabitants (health, housing, accessibility, education, economy, and environment) and twenty indicators were considered (Table 1). The selection of dimensions, indicators and weights was carried out following Zulaica (2013), Zulaica and Celemín (2008) and Zulaica and Ferraro (2016). With the exception of the environmental dimension, indicators were obtained from the National Census. Celemín et al. (2015) sustain that the objective approach is the most widely used for quality of life, and is based on the analysis of secondary data (mostly social indicators) obtained from government agencies, censuses and statistics.

**Table 1.** Dimensions, indicators and weights considered in the analysis.

<b>Dimensions</b>	<b>Indicators</b>	<b>W</b>
Education	▪ Percentage of literate individuals	0.10
	▪ Percentage of households with a computer	0.10
Health	▪ Percentage of households supplied by a public water system	0.04
	▪ Percentage of households served by a public sewage system	0.04
	▪ Percentage of households with water provision indoors	0.04
	▪ Percentage of households with sanitary installation with water discharge system	0.04
	▪ Percentage of households with refrigerator	0.04
Housing	▪ Percentage of households with restroom/toilet for exclusive use	0.03
	▪ Percentage of households connected to a public natural gas system	0.03
	▪ Percentage of severely overcrowded households	0.04
	▪ Percentage of inadequate <sup>a</sup> housing	0.03
	▪ Percentage of households with materials quality IV <sup>b</sup>	0.04
Economy	▪ Percentage of home and land ownership	0.04
	▪ Potential Dependency Index (PDI) <sup>c</sup>	0.05
	▪ Percentage of unemployed population	0.05
Environment	▪ Percentage of population with Unmet Basic Needs (UBN) <sup>d</sup>	0.10
	▪ Population density	0.05
	▪ Percentage of areas where environmental risk activities are conducted or 300 m away from those areas	0.05
Accessibility	▪ Percentage of flood-prone areas	0.05
	▪ Percentage of census radius area covered by public transport service less than 300 m away	0.05

<sup>a</sup> The National Census groups under this category dwellings defined as shacks, tenant rooms, hotel or boarding houses, property unfit for living, mobile homes, or built in the street.

<sup>b</sup> This category includes dwellings built with nonresistant or solid or waste materials in at least one of the parameters considered (ceiling, floors, walls).

<sup>c</sup> The PDI provides a rough idea of the economic dependency burden of a population, since it links "potentially inactive" population to "potentially active" population.

<sup>d</sup> This indicator identifies dwellings having issues with infrastructure (insufficient space, precarious structure or lack of sanitary facilities), school attendance or the capacity to generate economic resources.

Most indicators were obtained from the last 2010 National Census of Population, Households and Housing by the National Institute of Statistics and Censuses (INDEC

2010) at a census radius level, using REDATAM software (R + SP Process). Indicators selection was conditioned by the availability of same data from 2001 census, since HI evolution is analyzed between 2001 and 2010. The census radius includes the spatial reference units in this study. Regarding environmental quality, the population density indicator, which refers to social pressure on resources and territory, was calculated. The remaining indicators (percentage of areas occupied by activities involving environmental risks or lying 300m away from those areas and percentage of flood-prone areas) were obtained from a database developed by Zulaica and Tomadoni (2015).

Subsequently, the indicators were weighed to reach an HI scale between 0 and 1, assigning a value of 0.2 to each dimension. As far as the environment and accessibility dimensions are concerned, which directly express the population–environment relationship, a total score of 0.2 was considered for both. Therefore, it is assumed that a relatively uniform weight is assigned to habitability dimensions. As mentioned above, this methodological design has been widely applied in previous studies for the construction of quality of life indexes.

The values obtained for the chosen indicators were standardized in order to transform them into dimensionless units for comparison purposes. In this case, and taking into consideration the indicators weight, the Omega Score (Buzai 2003) technique was applied.

This procedure transforms the indicator information by taking it to a measure range from 0 to 1, minimum and maximum values, respectively. In this case, the highest value (1) describes the best situation of each indicator, while the lowest (0) reveals the worst. The formulae used are shown below according to the positive or negative sense:

- Indicators whose increase implies a relative worst situation:

$$SIV = (H - p)/(H - l)*WV$$

- Indicators whose increase implies a relative best situation:

$$SIV = (1-(H - p)/(H - l))*WV$$

Where: *SIV*: standardized indicator value; *p*: original piece of information to be standardized; *H*: highest value of indicator; *l*: lowest value of indicator; and *WV*: weighted value of indicator.

Once the standardized value of each indicator has been calculated, the results obtained were added for each radius, thus defining HI, expressed as:

$$HI = \sum SV$$

The results obtained for each dimension were spatially represented in maps elaborated in gvSIG (version 1.11), and the particular situation of the dimensions and HI was analyzed. Five categories were defined: Very Low, Low, Medium, High and Very High. The values of the indices of each spatial unit were classified into five intervals defined by natural breaks. This method identifies break points between classes using a statistical formula (*Jenks optimization*), which minimizes the addition of variance within each class.

Subsequently, in order to analyze HI evolution in the last intercensal period, the 2001 index was calculated, considering the statistical data for that year (INDEC 2001). Firstly, it was necessary to make 2001 and 2010 spatial data bases compatible, since the limits of the census radius were different in both years. HI was recalculated for 2010 having as spatial reference units 2001 census radius, since each of them groups, in general, two census radius of 2010.

The spatial unit compatibility process was conducted for each dimension to obtain a map expressing the difference between HI values in both periods. Defining categories by *natural breaks* allowed classifying the spatial units according to HI value major deterioration, deterioration, slight improvement, improvement and major improvement.

In order to compare HI values with population growth in each spatial unit, the methodological procedure used by Zulaica and Celemín (2014) was followed. Population growth rates were calculated between 2001 and 2010 for each unit of analysis. In this study, the exponential model was used, which, unlike other mathematical models, assumes that growth occurs continuously and not in each time unit. To do so, the following equation was used:

$$P_i * e^{k*r}$$

Where:  $P_i$ : Initial population;  $e$ : Base of natural logarithms;  $k$ : years elapsed; and  $r$ : growth rate.

Growth rate is expressed by the following formula:

$$r = \frac{1}{k} * \ln \left[ \frac{P_f}{P_i} \right]$$

Where:  $r$ : Growth rate;  $P_i$ : Initial population;  $P_f$ : Final population;  $k$ : years elapsed.

The equations for the exponential curve assume that  $r$  is constant over  $k$  years during which projections are carried out. Following the model mentioned, and in order to visualize a possible future scenario, a projection of population growth by 2020 was made. This allowed to detect the most critical sectors and the potential population in the most unfavorable conditions of HI (Zulaica and Celemín 2014). Just like for HI, five categories of growth rate were defined and relationships with index distribution established.

The objective approach to quality of life from an HI analysis was complemented with a subjective one. According to Marans and Stimson (2011), the subjective approach intends to collect primary data, which allows to capture individual's appraisal and behavior. This requires the incorporation of qualitative techniques that demand a strong reflexivity process.

In this case, an exploratory perspective was chosen, which allowed to compare HI results in the areas detected as the most critical ones, under complementarity logic, as a validation alternative (Denzin and Lincoln 2012). To do so, based on a previous study conducted by Oriolani (2016), semi-structured interviews were carried out between 2015 and 2016 with key informants and neighborhood inhabitants. At the same time, journalistic material was analyzed and field observations performed. This allowed to evaluate the possibility of incorporating new interviewees to account for conflict situations worthy of consideration. In this sense, the recursive strategy of qualitative research advances in line with the information that is produced and analyzed, and determines the steps to be followed in an open and flexible research design (Serbia 2007).

The selection process of interviewees was organized by means of the "snowball" technique, getting access through personal contacts or key informants who facilitated a first approach. Interviews were focused on social actors who actually knew the area for their work activity, length of residence, previous knowledge, or being affected by specific problems.

In order to systematize the 12 interviews conducted in 2015 and 2016, a codification process was generated based on specific topics included in the habitability dimensions contemplated in HI. Following Fernández Núñez (2006), the steps below were used to analyze the interviews:

1. Data gathering through interviews with actors, field notes, and observations;
2. Data capture, transcription, and ordering;
3. Data codification, grouping into categories that concentrate ideas;
4. Data integration, relating the categories obtained in the previous step to the theoretical principles of this research.



In this way, the qualitative tools used for the analysis of the most critical HI situations were based on data analysis and organization about the following main topics:

1. Environment and/or context of interviewed actors;
2. Actor's definitions of the habitability dimensions on which the study is based;
3. Opinions about people and objects (how people see themselves, outsiders, objects in their world);
4. Strategies, i.e., ways in which things are "obtained", tactics, methods and techniques people use to meet their needs.

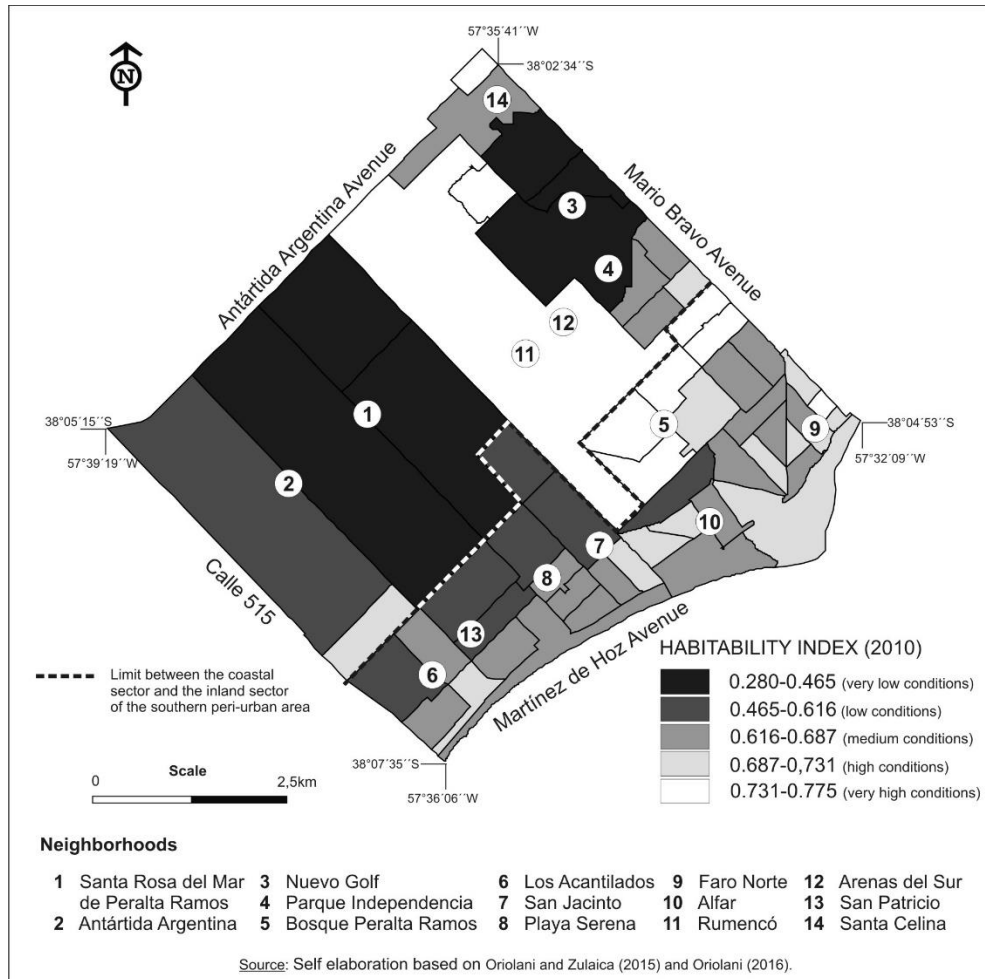
The subjective analysis of the quality of life provides a current view of the southern peri-urban area (not yet captured in the statistical data used) and of its evolution from a different perspective to that of quantitative indicators. As Baeza (2002) points out, qualitative research allows to approach social reality by highlighting the subjective view of individuals, complexity of phenomena, historicity and systemic image.

#### **4. Results**

Based on the methodological procedure described above, the results were organized into five sections. The first three sections place emphasis on the objective aspects of the quality of life and center on HI analysis, while the last two focus on subjective aspects.

##### ***4.1. Objective Dimensions of Quality of Life in the Southern Peri-urban Sector***

The key role that objective social indicators play in the analysis of quality of life is, among other things, that they provide additional information other than traditional economic measurements (Celemín et al. 2015), assuming that the implicit dimensions of the concept are multiple and interrelated. The HI analysis constructed from previous studies intends to contribute to better understand the different dimensions of quality of life from a sustainability perspective. Figure 2 illustrates the spatial distribution of HI results in each unit of analysis.

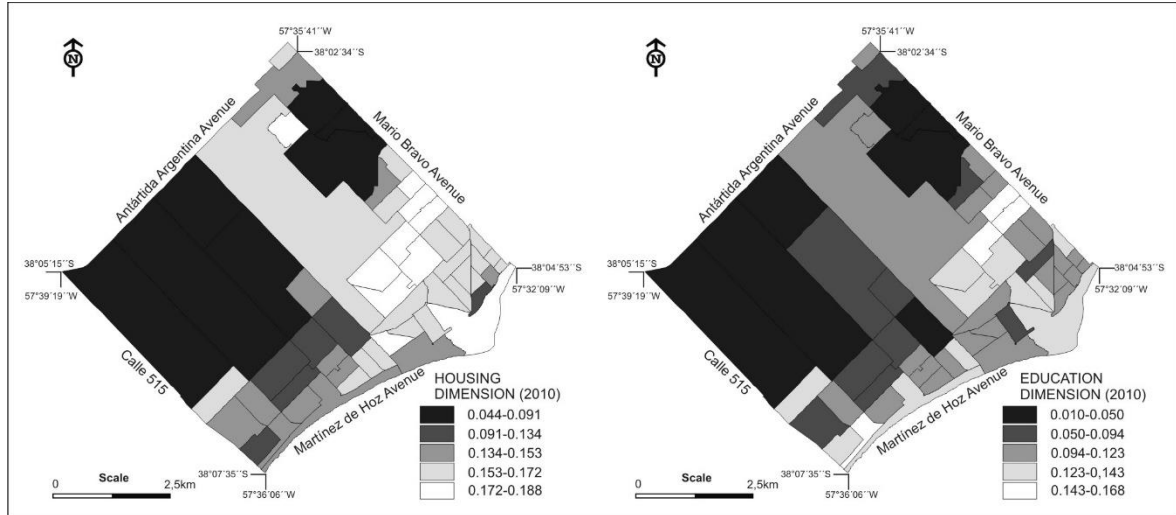


**Figure 2.** Habitability Index in the southern peri-urban area of Mar del Plata (2010).

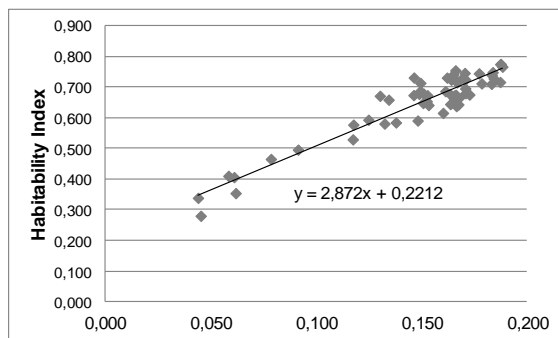
In general, the situation faced by the inland sector of the southern peri-urban area is critical if compared with the coastal sector. Very low habitability conditions (HI: 0.28-0.465) are registered in the Santa Rosa del Mar de Peralta Ramos, Antártida Argentina, Nuevo Golf, and Parque Independencia neighborhoods, representing 17.69% of the inhabitants of the study area. Conversely, the Bosque Peralta Ramos and the area occupied by gated communities show very high habitability conditions (HI: 0.731-0.775) representing 23.02% of the population in the southern peri-urban area. Low conditions characterize the inland sector located to the west, including zones of Antártida Argentina, Los Acantilados, San Jacinto and Playa Serena. Average conditions (HI: 0.616-0.687) are mainly reported in the coastal sector away from the urban areas and near Mario Bravo Avenue of the inland sector. Finally, high conditions (HI: 0.687-0.731) are reported especially in the coastal areas near the urban areas. In this case, Faro Norte and Alfar neighborhoods should be highlighted.

As already mentioned, life quality is a multidimensional concept (Branston 2002) that can include objective aspects with measurable indicators. When the dimensions that make up HI are individually analyzed, housing and education have the highest incidence in HI distribution (Figure 3). This is corroborated by applying the linear correlation coefficient, or Pearson's  $r$ , which reaches 0.945 for the housing dimension ( $r^2= 0.8922$ ) and 0.906 for the education dimension ( $r^2= 0.8217$ ). In both cases, the abovementioned coefficient, which measures the degree of linear relationship between the variables, shows a high positive correlation that can be verified in the scatter plots (Figures 4a and 4b). In these

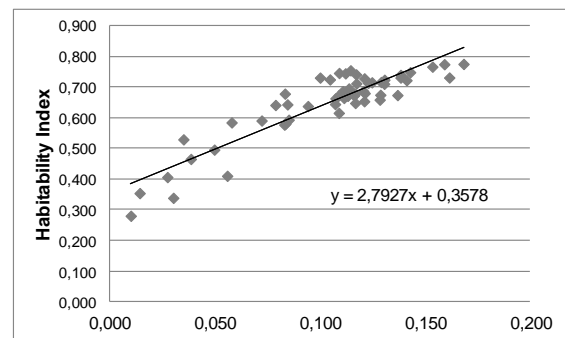
graphs, the y-axis represents HI, while the x-axis shows the standardized values of each dimension. The increase in the standardized values of housing and education dimensions represent an increase of 2.872 and 2.793 times HI values, respectively, which define the slope in each regression line.



**Figure 3.** Southern peri-urban sector of Mar del Plata: Housing and Education dimensions (2010).



4a. Housing dimensión



4b. Education dimension

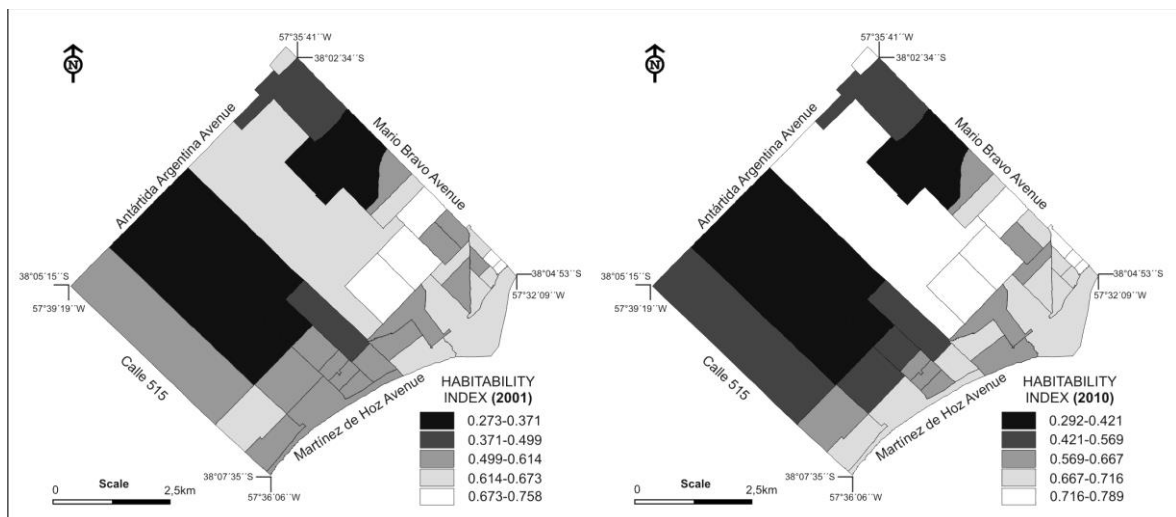
**Figures 4a and 4b.** Scatter plots of habitability Index and housing and education dimensions.

With regard to the housing dimension, precarious housing arrangements with inadequate health services, no privacy or physical accessibility, and unsafe conditions, among other issues, affect the subsistence, identification and integration needs of social groups. In this sense, the presence of precarious settlements in the inland peri-urban sector (Antártida Argentina, Santa Rosa del Mar de Peralta Ramos, Nuevo Golf and Parque Independencia neighborhoods) determines deficient conditions in most of the indicators considered that affect individual and collective well-being. This situation has been evidenced in previous studies (Zulaica 2013, Zulaica and Ferraro 2016). Education plays a key part in well-being, for being considered an essential mechanism for personal development and labor integration. The analysis of the spatial distribution of this dimension allows establishing the areas with greater difficulties of social inclusion, which negatively affect the quality of life. According to the categories defined by Sabuda (2008), in the Nuevo Golf and Parque Independencia neighborhoods, despite the educational facilities available, the family socio-cultural conditions prevent adequate school performance. In Antártida Argentina and Santa Rosa del Mar de Peralta Ramos, in many cases, access restrictions to facilities are added to the lack of socio-cultural support to

develop educational qualities that positively affect habitability conditions and, therefore, steadily improve the quality of life.

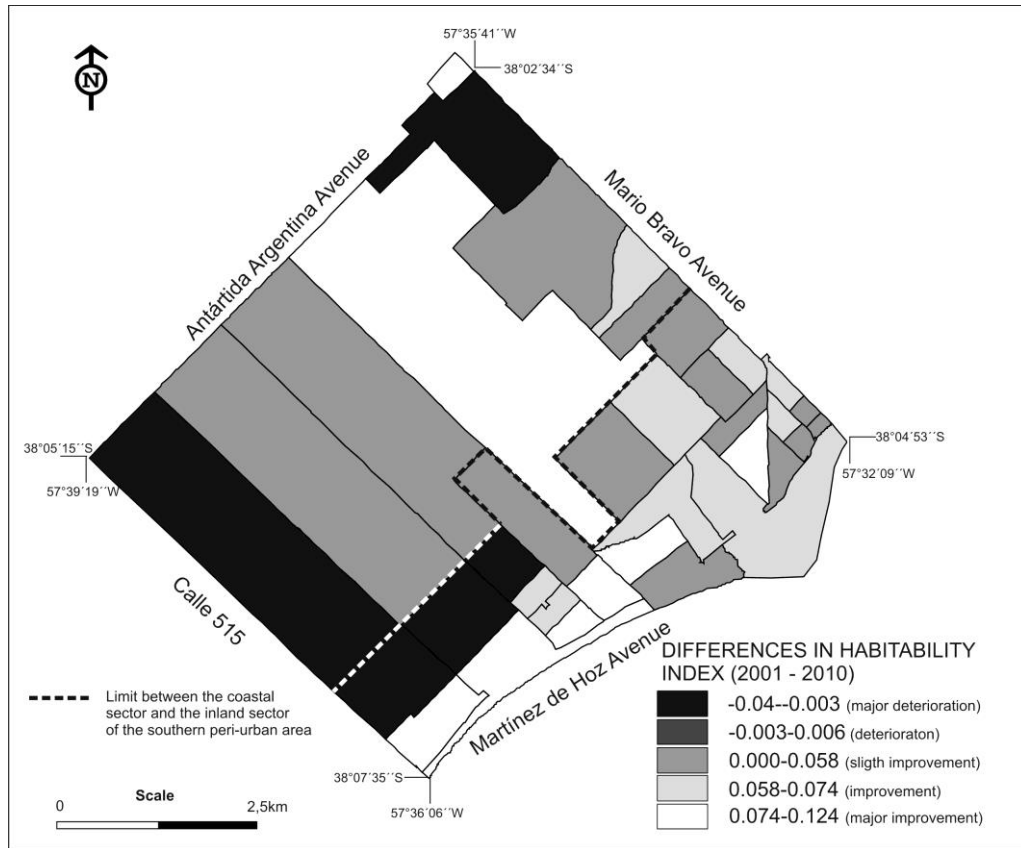
#### 4.2. Evolution of the Habitability Index (2001-2010)

In order to analyze HI evolution from 2001 to 2010, spatial units were adjusted according to the 2001 census radius. The calculated index according to this new configuration for 2001 and 2010 is spatially represented in Figure 5. The results obtained for both years show a similar configuration. The neighborhoods in most critical situations are Antártida Argentina, Santa Rosa del Mar de Peralta Ramos, Nuevo Golf and Parque Independencia. The census radius in this condition group 14.10% of the inhabitants of the southern peri-urban area in 2001, and 13.69% of the population in 2010. The Bosque Peralta Ramos neighborhood and a sector of Faro Norte yielded very high HI values in 2001 (HI: 0.673-0.758), representing 12.55% of the total population included in the census of that same year. In 2010, the census radius where Rumencó and Arenas del Sur gated communities lie was added to the areas with very high HI (HI: 0.716-0.789). These areas with better habitability conditions reached 26.78% of the inhabitants of the study area in 2010. In 2001, like in 2010, the indicators of education and housing dimensions defined the general HI distribution.



**Figure 5.** Southern peri-urban area of Mar del Plata: Habitability Index adjusted to the 2001 census radius.

In order to establish comparisons between both years, a map was drawn (Figure 6) which shows the differences in the HI calculated for both time periods. The analysis permits to affirm that sectors of Antártida Argentina, Los Acantilados, San Patricio and Playa Serena and Santa Celina neighborhoods experienced major deterioration regarding habitability conditions. In contrast, the coastal areas, which are further away from the urban sector, and the radius that includes the gated communities showed major improvements.



**Figure 6.** Southern peri-urban area of Mar del Plata: Differences in the values of the Habitability Index between 2001 and 2010.

When differences are analyzed in each period taking into account the different dimensions, results show that the indicators of housing and education dimensions have greatest incidence both in the deterioration and improvement of the most significant HI.

Regarding improvements, among the indicators of education dimension, the percentage of households with computers increased the most. This indicator assesses the capacity to use New Information and Communication Technologies. Even though the indicator is associated with income level, digital inclusion is a key issue today, given the importance of new technologies in terms of labor and social insertion (INDEC 2012). On average, in 2001, the percentage of households with computers barely reached 14.98%, while in 2010, the value rose to 49.77%.

As regards the housing dimension, the indicators that showed strongest positive variations were the percentage of households with a refrigerator and connection to a public natural gas system. Refrigerators availability is crucial to guarantee food security. Food proper conservation prevents diseases; therefore, refrigerators are considered a necessary appliance to guarantee people's quality of life (INDEC 2012). In the analyzed period, the value increased from 55.63% to 96.16% on average. On the other hand, being connected to the gas network facilitates the development of domestic activities and provides comfort to households. Data from the study area show that this value increased from 39.4% to 53.42% in the analyzed period.

Other relevant changes are presented in a basic sanitation indicator, such as the percentage of households supplied by a public water system, whose value increased from 39.86% in 2001 to 55.95% in 2010 on average.

The analysis of indicators variation according to the most relevant deterioration in the index shows a contradictory situation. Despite the fact that most changes in the housing

dimension indicators: Percentage of inadequate housing, Percentage of households with materials quality IV, were positive, only some sectors were benefited. Major deterioration in the census radius is explained by the increase in the value of these two indicators, together with the higher percentage of unemployment corresponding to the economic dimension.

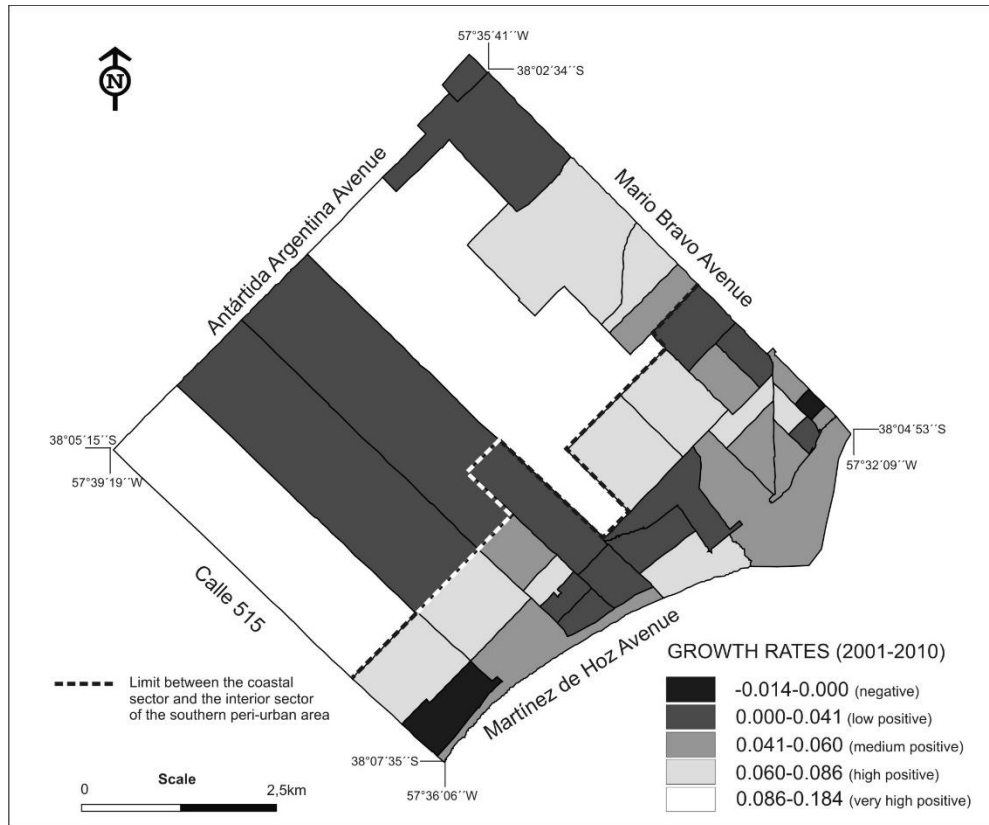
Undoubtedly, the critical values of these indicators are associated with the growth of precarious settlements, which represent severe social conflicts with the land tenure regime (illegitimate occupation of public or private lands), and intensified since the 2001 crisis (Zulaica and Celemín 2014). In these neighborhoods, the quality of life deteriorated in the analyzed period. Lucero (2008) points out that one of the most visible consequences of this deterioration is the reduction in consumption ascribed to a lower income in households. Likewise, shortfall in revenues (in a context of aggravation) and the extremely unequal distribution dramatically accentuate the inequality map of human development in the territory. Lucero further states that the breakdown heightened in early 2002, when the monetary policy affected the purchasing power of the population.

In short, it can be asserted that despite the increase in the general values of the index in the different categories during the analyzed years, the differences intensified in the southern peri-urban area, deepening the inequalities between the coastal sector and the inland sector.

#### ***4.3. Habitability Index and Demographic Growth***

García Ballesteros (1986) points out that, from a Geography perspective, population studies are analyzed by Demogeography, also referred to as Population Geography, a branch of this field science that resorts to statistical instruments and concepts of Demography such as rates and the model of demographic transition, and deals with the spatial location of the variables used. This discipline provides valuable information for studies on quality of life.

Among other things, the fact that land rent is more affordable in peri-urban areas has led to a more pronounced growth of this sector if compared to that of Mar del Plata. As already mentioned, peri-urban Mar del Plata and the southern sector, in particular, yielded higher growth rates than the District as a whole did. However, significant differences can be encountered in the southern peri-urban area (Figure 7).



**Figure 7.** Southern peri-urban sector of Mar del Plata: Demographic growth rates for the period 2001-2010.

The slightly negative growth rates (-0.014 to 0) correspond only to two census radius located in sectors of Faro Norte and Los Acantilados neighborhoods. The growth rates of practically all spatial units in this area are positive. Those with a very high positive growth (0.086 to 0.184) are located in two sectors: one that includes part of Antártida Argentina neighborhood and the other where the gated communities lie on Jorge Newbery Avenue, founded in 2006.

High positive growth (0.06 to 0.086) rates occur in Nuevo Golf, Parque Independencia, Bosque Peralta Ramos and sectors of Los Acantilados, San Patricio, Playa Serena and Alfar neighborhoods. The other census radius present low and medium positive growths.

The correspondence analysis between HI results and demographic growth rates allows to detect the most problematic situations with low or very low HI and high and very high positive growth rates in Nuevo Golf and Antártida Argentina neighborhoods. The areas mentioned grouped 10.56% of the population living in the southern peri-urban area in 2010 (2945 inhabitants). These neighborhoods show a population projected to reach 4573 inhabitants, or 12.31% of the total in 2020.

The areas above mentioned are occupied by precarious settlements. According to Zavaro (2005), in 1999, 47% of Mar del Plata residents lived below the poverty line, and, in 2002, this figure reached 57%, while 8% fell into poverty. In this context of crisis, that deepened in 2002, the disadvantaged population migrated to these sectors from the city, where land and housing problematic was not great. These settlements have also grown with migrants from other parts of the country, also hit by the crisis, namely from Buenos Aires metropolitan area.

At the other more favorable extreme of habitability and with high and very high positive growth rates are gated communities. These neighborhoods were established in the

mid-2000s. In general, they are targeted to high-income families, and are the choice of couples between the ages of 30 and 40 with 1 or 2 small children who seek tranquility and security. In some cases, residents are professionals from Mar del Plata and, in others, agrarian entrepreneurs from the metropolitan area (Zulaica and Celemín 2014). The census radius corresponding to the Bosque Peralta Ramos neighborhood are also part of this reality, where young families from Mar del Plata migrate to move away from the city lifestyle. These areas have a population of 4853 inhabitants (17.4% from the southern peri-urban area in 2010) with a projected growth of 21259 inhabitants (34.55%) for 2020.

Data gathered from the National Census do not account for the processes that took place after 2010. In this regard, it is worth mentioning that, the public policies promoted in the last decade, such as the Pro.Crea.Ar program (Argentine Bicentennial Mortgage Program for Sole family-Dwelling Property) in 2012, promoted affordable land and housing to middle-income families who had not been served by housing programs in previous years (Canestraro 2016). The southern peri-urban area consolidated as one of the most convenient destinations due to its lower land prices in line with the ceiling required by the Pro.Crea.Ar program and the desire to move away from the noise of urban places and take refuge in a pleasant landscape. This new dwellings were built far from the urban area (Nicolini and Olivera, 2015), Los Acantilados, San Patricio, Playa Serena and San Jacinto neighborhoods being the choice of many in the study area. In parallel to the above, a growth of gated communities located on Avenida Jorge Newbery towards the coast and at the intersection with Calle 515, limit of the study area, is noticed.

Even though these recent phenomena are not reflected in the data studied, the analysis of the relationships between HI and demographic growth in the southern peri-urban sector provides useful diagnostic bases to identify critical areas that demand intervention strategies aiming at directing population growth and improving the quality of life.

#### ***4.4. Subjective Contributions to the Analysis of Quality of life Dimensions***

The previous sections dealt with the objective dimensions of the quality of life contained in the concept of habitability. Nonetheless, it is worth underlining that in recent years the number of investigations that include subjectivity in the study of quality of life has increased, focusing on the satisfaction or evaluation of life made by the individuals themselves (Celemín et al. 2015).

The history and development of the neighborhoods are determined by a set of phenomena influenced by structures resulting from the past demographic dynamics and by individual and family decisions that are differentiated according to the social status and region (Marcos 2010). As a consequence, the subjective quality of life is affected by family relationships, financial situation, work, community and friends, health, personal freedom, and personal values (Ansa Eceiza 2008) which vary over time and space since they relate to the individual's history.

As mentioned in the methodology, this section aims to expand the results obtained through a quantitative approach, deepening the dimensions contained in the concept of habitability that directly affect the quality of life of the inhabitants of the southern peri-urban area. The goal is to interpret the meanings that the actors give to their quality of life, as a way of integrating the objectivity proposed in HI with the subjectivity of the social world representations (Bourdieu 2011) that the actors have. This manuscript, places emphasis on the areas where HI accounted for the most critical situations, including Antártida Argentina, Santa Rosa del Mar de Peralta Ramos, Nuevo Golf and Parque Independencia neighborhoods.



To a greater or lesser extent, all the interviewees recognized that the habitability problems in their neighborhoods are rooted in their origins, as a consequence of the expansion process Mar del Plata went through. It occurred in a "spontaneous" manner and affected different factors that impact the quality of life. When analyzing, from the actor's perspective, the different dimensions intertwined in HI, a new perspective can be visualized that sometimes coincides with the objective aspects of the quality of life, while, in others, differs or the analysis is insufficient.

#### *4.4.1 Housing dimension*

Regarding the housing dimension, the actors recognized housing as a determinant of quality of life. Moreover, the interviewees stressed the precariousness of the neighborhoods they live in. Substandard housing has a negative impact on family health, as reaffirmed by the social worker at the Heath Unit of Antártida de Argentina neighborhood.

Housing situation in these neighborhoods poses different problems regarding household quality and the building materials used, as stated by the neighbors of Nuevo Golf and Parque Independencia. Undoubtedly, these conditioning factors affect the habitability of the population, deepening social and health vulnerability as identified by the actors themselves.

In these neighborhoods, land appropriation is often linked to the lack of choice and accessibility to locations that the actors consider more appropriate to meet their work needs and housing expectations. Most houses in these neighborhoods were self-constructed with precarious building materials. This leads to health issues and expose inhabitants to critical environmental factors.

The housing problem is addressed by the State with public policies intended to improve substandard housing in the most vulnerable sectors. On the one hand, the State recognizes the social and housing situation and allocates funds to solve some of these issues. On the other, interviewees claimed that such funds are not granted to tenants but to "illegal" landowners who built their houses in expropriated public lands without a title deed. Somehow, by allocating funds to alleviate this problem, the State has accepted the occupation of public lands in these neighborhoods, as some neighbors pointed out.

As it emerges from above, access to land and housing constantly permeates the housing problem of the study area. Legality is a determinant of quality of life since "illegality", the term used by interviewees to account for the irregular situation of land ownership, is, in many cases, legitimized by the State. In this way, the residents of informal settlements highlighted that the State does not guarantee compliance with the law that demands an urgent solution to the housing crisis. Some interviewees clearly identified the State as responsible for implementing policies that satisfy the right to housing and a decent habitat under the Provincial Fair Housing Act No. 14449. In 2004, in the Province of Buenos Aires, it was estimated that about 3 million people lived in an irregular situation. In Mar del Plata, 200 informal settlements were surveyed in public lands and 80 in private lands, which represent around 10% of the population (Canestraro 2004).

#### *4.4.2 Education dimension*

Regarding the general education level of the neighborhoods under analysis, the interviewees perceived it as low. Many pointed out that achieving higher levels of education was not a priority for their families. The interviews with teachers and neighbors unveiled the existence of family issues related to drug use, impossibility of gaining access

to the labor market and family violence. The possibilities of insertion in the labor market are closely related to the education level. This is reflected in the economic dimension of habitability, which accounts for the difficulty to access to labor sources and also for the economic crisis processes that took place in the country, and strongly manifesting at a local scale. The actors affirm that after the 2001 crisis, many areas in the southern peri-urban sector grew under strong informality. The occupation of public lands, labor instability, and lack of access to goods and services, are among of the most visible manifestations of this crisis.

As argued by elementary school teachers from Antártida Argentina and Santa Rosa del Mar de Peralta Ramos, physical accessibility to educational facilities should be added to the sociocultural determinants that limit access to education in these neighborhoods. This conflict is not highlighted in HI (improvements are reported when analyzing the evolution of the accessibility dimension), though it is crucial for the families living in these neighborhoods, especially for Antártida Argentina and Santa Rosa del Mar de Peralta Ramos neighborhoods, located further away from the city. Apart from the proximity to public transport, sociocultural accessibility indicators should be incorporated in future research projects.

#### *4.4.3 Accessibility dimension*

The problem of accessibility to facilities, goods and services in these neighborhoods is strongly linked to the possibilities offered by intra-urban means of transport, which guarantee (or not) public transportation. Public transport is key in the neighborhoods studied, since most of the activities carried out by their inhabitants take place in the urban area, which involves daily commute.

HI allowed to define areas with accessibility difficulties in these neighborhoods. Yet, the problem becomes more relevant when the vision of the actors themselves is considered. In Antártida Argentina and Santa Rosa del Mar de Peralta Ramos, all interviewees agreed that the problem is critical, the latter being the most disadvantaged neighborhood.

To address this issue, the local administration incorporated the service of a bus to guarantee public transportation in the neighborhoods. This service operates irregularly and is usually subject to school hours, which complicates commute, according to the neighbors' statements.

The irregularities in transport service are accentuated by the poor condition streets are in, thereby affecting the quality of life of the residents and deepening socio-territorial differentiations. Interviewees perceived transport situation as deplorable and deficient, which limits transportation possibilities. Nuevo Golf and Parque Independencia neighborhoods also share this problem. At the end of 2015, bus frequency was reduced due to insecurity reasons, although neighbors claimed that the true reason behind was "trade union" disputes. Neighbors perceived "discrimination" on the part of bus companies, because frequencies were reduced due to an act of violence. Interviewees argued that even though the police force committed to guarding buses entering the neighborhood, the bus companies refused to reinstate the service.

According to neighbors, bus transport disruption has been dragging on for years in this area, though for other reasons. For instance, in 2014, the frequency was interrupted by the presence of a clandestine dump that led to flooding and prevented buses from reaching the neighborhoods.

Absence of lighting should be added to the above, creating greater insecurity. This problem was not taken into account by HI due to lack of specific data. The interviewees

perceived the inaction on the part of the municipality regarding public transport service, street lightning and the safety of both bus drivers and neighbors. A member of a Development Association in Nuevo Golf neighborhood attributed accessibility problems to failed attempts of agreement between the bus companies and the mayor in office.

Accessibility difficulties restrict personal freedom and the right to commute to and from the places of work, educational facilities, hospitals and health care centers, and recreation sites, among others, limiting the possibility of meeting the needs and desires considered fundamental for an adequate quality of life. The interviewees claimed to feel "hostages", which shows the relevance of this dimension when analyzing habitability.

#### *4.4.4 Health dimension*

The analysis of the health dimension from the actors' perspective revealed that access to drinking water was the major concern in all cases. Neighbors are not connected to the water supply system and, even if available, access is restricted due to irregular land ownership. Land ownership limits access to public services in informal settlements. Water is drawn by a pump or impeller pump. However, not all dwellings have a pump, so they have no access to tap water. In these cases, drinking water is delivered through community tanks.

In the interviews, neighbors showed concern for cooking and drinking water quality as they notice that the activities carried out in the vicinity generate pollution. On the other hand, the situation is aggravated by the precarious electric service that exacerbates the problem for those who depend on an electric pump to get water.

According to the doctor and social worker of the Health Unit at Antártida Argentina neighborhood, access to drinking water is a universal right, explicit in the Goal 6 of the Sustainable Development Goals. However, the current situation in peri-urban neighborhoods shows that access is extremely limited. Despite the fact that HI results indicate improvements in the extension and supply of health services (the standardized value of the health dimension increased from 0.11 to 0.13 between 2001 and 2010 on average), neighbors allege that this problem remains one of the most critical concerns.

In addition, Santa Rosa del Mar de Peralta Ramos has physical limitations for drilling. Water availability is through community tanks distributed in the area and supplied by the municipality through a tanker truck. Most dwellings in this sector have limited access to water indoors. Neighbors emphasize, leaving aside maintenance, that tanks are not always filled (leading to water shortage) and are exposed to rupture, which affects water quality.

Notwithstanding the above, the interviewees placed emphasize on solidarity and the relationship with other neighbors as an alternative response to this problem. This is not captured by HI, though it is mentioned by the actors as a chief and positive aspect in their quality of life.

#### *4.4.5 Environmental dimension*

Regarding the environmental dimension, HI does not show significant changes in the period analyzed. The selected indicators allow to characterize some aspects of the environmental problems encountered in the area. Nonetheless, the interviews conducted aim to capture the main concerns of the inhabitants. The most relevant topics that arose from the interviews were: the pollution deriving from the landfill site for final disposal of waste used until 2012, the exposure to fumigation with agrochemicals in residential areas near agricultural ones, and the presence of clandestine dumps and flood risk.

The field work revealed critical situations in Antártida Argentina and Santa Rosa del Mar de Peralta Ramos, for being exposed to the polluting effects of the former landfill site that affected water quality. The interviewees indicated that the new landfill inaugurated in 2012 improved life in the neighborhoods.

The doctor at the Health Unit in Antártida Argentina, specified that skin diseases such as allergies, probably caused by garbage and agrochemical contact, are common pathologies in the population.

Regarding waste disposal, the neighbors of Nuevo Golf and Parque Independencia pointed out that clandestine dumps emerge as alternative recycling markets. It is even known that garbage trucks sometimes dump their contents in home doors, and once classified they are traded on informal markets.

Another environmental impact faced by Antártida Argentina and Santa Rosa del Mar de Peralta Ramos is fumigation with pesticides, mainly used on soybean. Even though the municipal Ordinance No. 21296/13 prohibits the use of toxic substances harmful to human health to less than one thousand meters, the neighbors affirm that the effective compliance is not ensured.

Moreover, the horticultural production of farmers is characterized by poor conditions and labor precarization: workers are exposed to agrochemicals that impact on their health and that of their families. Some of these aspects have been analyzed by Souza Casadinho and Bocero (2008) and Cabral and Zulaica (2015).

The strategies of the inhabitants to face these conflicts consist in organizing and generating collective actions in order to guarantee certain environmental criteria of habitability. In many cases the desired response is not obtained; however, these links strengthen the neighbors, which is directly related to social group habitability.

HI revealed flood risk in the neighborhoods analyzed. The inhabitants affirmed that accessibility difficulties are one of the most immediate and relevant consequences of floods. Interviewees also said that natural phenomena add up to the absence of adequate infrastructure and deepen the problem.

On the other hand, the fact that lands in Antártida Argentina and Santa Rosa del Mar del Mar de Peralta Ramos are flood prone turns them more affordable for low-income inhabitants. The social worker at Antártida Argentina neighborhood noted that this situation reinforces the social division of space reported in the area of study.

#### ***4.5. A look into the future***

Problems in the southern peri-urban sector are intertwined and complex to be solved. The ever increasing land values in urban areas renders land and housing unaffordable to vast sectors. In this sense, land rent becomes a determining factor in the social division of space (Núñez 2012).

Living in the peri-urban sector results from multiple social and economic conditions, which depending on the area, are determined by the choice and / or accessibility that the inhabitants have. The laws intended to regulate real estate speculation regarding land value (such as the Fair Housing Act) have not been able to fulfill their social goal as of yet. In recent years, land value has skyrocketed.

Actors perceived changes in land values and attributed such change to the increase in the demand of land generated by the Pro.Cre.Ar program. This program is recognized as a driving force to support access to housing, but also as a determinant factor in the increase of land value.

This comes to show how the state housing policy promotes a double standard: on the one hand, it tends to consolidate the land market, considerably revaluing the land price of the sector; and, on the other, it promotes accessibility to a population sector with social and economic requirements, limiting space to the most vulnerable sectors.

This diffuse city model, as defined by Rueda (1997), which extends to areas increasingly distant from the urban center as a result of peripheralization mediated by the considerable increase in rent cost, affects the living conditions of the most vulnerable sectors and deepens the differences in the objective and subjective quality of life of the inhabitants.

The lack of adequate planning in the peri-urban sector, in conjunction with the market force, create exclusive spaces established by the population socio-economic status, a territorial "puzzle" that disintegrates the social structure and dilutes the sense that the city has. In turn, the city becomes unaffordable due to the high infrastructure and energy costs, leaving low-income families marginalized (Rueda 1997).

In the same vein, the differences in land rent between the coastal and the inland peri-urban sector are significant. The configuration of these spaces has been totally different. Even though the coastal sector is based on a seasonal project, linked to the summer and to tourists with a "second home", peripheralization has led to a significant growth of the stable population, accompanied by expulsion processes after economic crises. However, the growth rates of the inland peri-urban sector have been much more significant, and shown more severe conflicts. Between 2001 and 2010, the population of the coastal peri-urban area increased 56.18% while the inland reached 83.5%. The projections for 2020 estimate a population growth of 72.58% for the coastal and 177.82% for the inland peri-urban sector.

As Reese (2006) affirmed, the new demands arising from the rapid and profound changes in society and in Argentine cities call for proper responses through new forms of urban intervention and management strategies. Therefore, the author states that the sense that land intervention acquires today is not only normative but fundamentally instrumental. Such interventions, as well as the regulations governing habitat production, should guarantee adequate habitability conditions by improving the quality of life of the inhabitants, though taking into account their own needs and expectations.

Problem management in the city expansion areas requires a new paradigm of urban planning. This new paradigm should privilege the real city, taking into account that it results from a multiplicity of agents. This presupposes a permanent revision to make adjustments or adaptations, which keep track of the dynamics of production and reproduction of the city (Reese and Catenazzi 2011).

## ***5. Final considerations***

This work deals with the concept of habitability, understood as a determinant of quality of life, from an integral perspective, directly related to the notion of sustainability and especially to the social sphere thereof. This conceptualization involves considering different dimensions (health, housing, accessibility, education, economy, and environment) that were analyzed from a quantitative and qualitative approach. This complementary approach allowed to deepen our knowledge about the quality of life in the southern peri-urban sector of Mar del Plata city, while addressing objective and subjective aspects contained in the concept, whose relation with the variables is complex (Cummins 2000).

The analysis of the objective aspects required the application of quantitative techniques based on the construction of HI. This index stems from the integration of

indicators that represent the six dimensions considered. Each dimension defines different categories of the index and allows to determine how far a spatial unit (census radius) is from the concept of social sustainability.

As mentioned in previous studies (Oriolani and Zulaica 2015, Zulaica 2013, Zulaica and Ferraro 2016), there is certain correlation between the results obtained for the extreme values of the indicators in the different spatial units. The most favorable HIs are generally obtained in areas close to the urban area as well as in coastal areas and in zones where gated communities are located. In turn, the most unfavorable index values are directly associated with the presence of precarious settlements.

This situation is revealed in the HI calculated from the 2010 census, and repeats itself in 2001. Even though the differences between both years show, in general, improvements in the index, disparities were accentuated. Basically, the indicators of housing and education dimensions, gave an account of the general distribution of HI.

When data on population growth are incorporated in the analysis of the 2001-2010 period, it is verified that there is no direct relationship between growth rates and habitability conditions: increased population growth is not necessarily reflected in lower index values and vice versa. Nevertheless, the analysis allowed to detect critical areas in which the habitability conditions were deficient and the population growth rates significant. In general terms, these areas of the southern peri-urban sector coincide with the lower HI.

Based on the above, the index gives an account of the territorial differentiations of the study area. Consequently, on the basis of the results obtained, it was possible to go deeper into the most problematic aspects, making visible the main conflict areas. Qualitative techniques were used to provide some subjective aspects of quality of life.

Even though the results obtained for the objective and subjective aspects of quality of life are independent, their degree of dependence increases when the objective conditions are critical (Yasuko et al. 2005). This situation is verified in the southern peri-urban area.

The qualitative techniques of data production allowed, on the one hand, to overcome the deficiencies presented by the quantitative tools, and on the other, to capture the views of those who are well aware of the social situation studied. In addition, interviews and fieldwork in the area provided relevant information on the processes that took place years ago. By so doing, different aspects of the empirical reality were revealed through the articulation of data construction techniques, enriching our understanding and interpretation of the phenomena.

However, Celemín et al. (2015) point out that the subjective assessment of quality of life can be substantially conditioned by individual psychological factors. In this sense, we intended to deepen the work done by including subjective indicators that contemplate the diversity of the actors who live in different neighborhoods of the southern peri-urban area. The subjective indicators allow systematizing the perceptions of the individuals about their living conditions and the social relations that they maintain in the evaluation of well-being (Villatoro 2012). This work could be a platform for further research using this type of indicators.

Likewise, as stated by Tonon and Castro Solano (2012), further studies should be conducted in order to enhance our knowledge of the perceptions and attitudes of the individuals at a microsocial/personal and a macrosocial/socio-political scale. Such knowledge would facilitate the creation of public policies that respond to the needs of the population in dynamic, heterogeneous and complex areas, such as the peri-urban sector.

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