Material and social deprivation in Italy:
an analysis on a regional basis

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Abstract
The existence of an inverse association between socioeconomic status and the incidence of most diseases is well-established in literature: higher rates of morbidity and mortality have been reported among lower socioeconomic groups in many European countries. However, it's an open question which component of socioeconomic status affects health most, and how that relationship should be measured. The relation between socioeconomic factors and health inequality may be proved at the individual level, or at the geographic-area level. In this paper we follow the second stream of literature, i.e studies on deprivation relating the state of disadvantage suffered by an individual, with the living conditions of the area where the individual resides. The aim of this study is to measure two different conceptions of deprivation, in order to develop two different indicators of deprivation: the first concerning material deprivation, through the study of direct variables, and the second related to social deprivation, calculated using indirect variables. The proposed indicators have been validated respectively with life expectancy at birth and a composite index of security, in order to determine which of the two indices affects more the living conditions. The final conclusion of this work leads to establishing the existence of two different deprivation indicators for 20 Italian regions, both validated and recommended as measures of the material and social disadvantage of one region compared to the other.

Keywords: Italy, Material, Social, Deprivation

JEL classification: A13, C43, C81

Introduction

Studies involving the analysis of differences related to the social and economic environment and determining a state of disadvantage, in relation to the living conditions of the community to which the individual belongs, fall within the realm of studies related to deprivation. In studies related to socio-economic disadvantage, different types of measurement of deprivation have been introduced to examine whether, and to what

extent, different conditions lead to differences in mortality and in the effectiveness of social and health treatments (Ivaldi and Testi 2012). This type of measurement is within the realm of so-called "deprivation indicators".

A set of variables or partial indicators appears to be the most appropriate instrument to measure socio-economic conditions, in order to better take into account their multidimensional nature. In fact, since there are multiple socio-economic variables related with health, it is difficult to derive scientific conclusions from the individual correlations, as these may vary depending on the context of application and are often affected by interactions between the variables and by problems of non-linearity of the relationship (Fuchs, 2004).

Deprivation highlights the characteristics of a group (that is, the population living in a defined geographical area) by measuring similarities and dissimilarities of those forming that group. Similarities may affect not only material conditions, but social and cultural ones as well (Gordon 1995).

Deprivation indices are defined referring to a small, well-specified geographical area where they "measure the proportion of households with a combination of circumstances indicating low living standards, or a high need for services, or both" (Bartley and Blane, 1994). Consequently, deprivation indices point out the close relationship that exists between deprivation and territory.

They are justified by the observation that the most deprived areas need, in a context of equity, a greater expenditure in terms of resources (Judge and Mays, 1994a, 1994b; Buckingham and Freeman, 1997). Knowledge of deprivation indices is therefore very important for resource allocation since, considering equity, more deprived areas should be assigned a larger amount of resources. (Sheldon and Carr-Hill, 1992).

Deprivation indicators differ from individual measures of disadvantage and from those by social class, since such tools are usually used to measure deprivation conditions. The measure of individual disadvantage, related to the income distribution within a population, is obtained by calculating the so-called "concentration ratio", which measures the inequality of the distribution between individuals. Compared to the studies on social classes, such indicators allow one totake into account a greater number of dimensions of disadvantage, and are not affected by any ideological implications (Payne et al., 1996).

These deprivation indicators are therefore connected to a well-defined geographical unit, within which they measure the proportion of households that have a combination of features that alternately indicate a low standard of living, a high demand for services, or a presence of both factors (Bartley and Blane, 1994 Carr Hill et al., 2002). This definition of deprivation indicators highlights the close link between the concept of deprivation itself and territory, although care should be taken in interpreting the results because "not all deprived people live in deprived areas, just like not all those living in a deprived area are themselves deprived" (Townsend et al., 1988).

Numerous studies have proven that the deprivation indicators based on the characteristics of the area of residence are suitable to explain the changes in morbidity, mortality, and in a wide range of socio-sanitary measures (Carstairs and Morris 1991; Sloggett and Joshi 1998; Boyle et al. 1999). When using indicators aggregated geographically, one assumes that they represent a good approximation of individual economic risk and that there is some "context effect" (Macintyre et al. 2002), i.e. a specific environmental factor that influences mortality while avoiding the so-called "ecological fallacy" (Lancaster and Green 2002), i.e. mistakenly infer the characteristics of an individual from those of its membership area (Sloggett and Joshi 1994).

Deprivation, being a "state of disadvantage" of people living in a certain territory, can be analysed in two ways: material deprivation leads to a lack of goods, services, resources, comforts normally enjoyed or at least widely accepted as primary goods (Testi and Ivaldi 2009). Social deprivation, on the other hand, implies a non-participation in the roles, relationships, customs, duties, rights and responsibilities implied by being a member of a given society or its subgroup (Townsend 1987; Townsend et al., 1988). Therefore, material deprivation describes the objective conditions in which individuals live. These conditions are described as "direct" variables, meaning that they directly measure what percentage of individuals living in a certain geographical area possess a certain feature: such as the houses that do not have toilets, residents who do not own their homes, unemployment, and so on. Other features, instead, do not necessarily involve deprivation, for example: belonging to an ethnic minority, performing manual labour, or being elderly. However, these features may indicate conditions of deprivation when, due to distortions of the society, they make it difficult to take part in roles, relationships, rights, and responsibilities that would be typical of a

member of a certain community. This type of deprivation, of a different nature than the previous one, is defined by Townsend as "social", meaning that it can be connected to some form of racism or marginalization, rather than to objective conditions (Atkinson et al 2001; Ivaldi et. al 2015).

Literature Review

Most indicators of deprivation cited in the literature come from Anglo-Saxon countries and relate to the health sector. They have mainly epidemiologic purposes rather than provide direct aid in the distribution of resources. In fact, especially at the beginning, they have been used to explain differentials in mortality in the various areas of the country, mainly between England, Wales and Scotland under the assumption that socio-economic disadvantage implies worse health. Originally, the use of deprivation indicators was restricted to the UK, then their use has spread to almost the entire world. Deprivation indices are quite simple, inexpensive instruments to measure the socioeconomic conditions of areas of residence because they are generally made up of census indicators which are easily available, combined using different types of statistical data (Bartley and Blane, 1994). For these reasons, deprivation indices are widely used in epidemiology and public health studies (Macintyre et al 2002; Carr Hill et al 2002; Davey Smith et al., 2001; Salmond and Crampton, 2002) and have been developed in the United Kingdom (Carstairs and Morris, 1991; Jarman, 1983, 1984; DETR 2000; Davey Smith et al., 2001; Forrest and Gordon, 1993; Gordon 1995; Gordon and Pantazis 1997) as well as many other countries in the world (Barnett et al.., 2001, 2004; Benach and Jasui, 1999; Buckingham and Freeman 1997; Crampton et al, 1997; Hales et al., 2003; Khelleher et al., 2002, Smits et al, 2002, Sutton et. al. 2002, Biggeri et al 1998; Rapiti et al 1999; Cadum et al. 1999; Michelozzi et al. 1999; Valerio and Vitullo. 2000; Quaglia et al. 2005; Vercelli et al 2006; Quaglia et al 2011; SLTo 2004; Spandonaro et al. 2004; Brenna, 2007; Costa et al. 2004, 2009; Torsheim et al 2004; Boarini and Mira D'Ercole 2006; Mackenbach et al 2003, Testi e Ivaldi 2009).

Methodological Approach

The geographic area taken into account consists of Italian regions. This is a sufficiently unbundled subdivision (Reijneveld et al. 2000) within which any differences can be noticed and for which there is comparable and reliable data, taken from population censuses and other Istat sources.

In the first place, we believe that the indicators, while taking into account some of the critical points highlighted (Macintyre et al., 2002; Lancaster and Green, 2002; Sloggett and Joshi, 1994; Crayford et al., 1995; Reijneveld et al., 2000), should be created at the geographical and not the individual level, because thanks to the territorial basis of the study the indicators of material and social deprivation of each region can be analysed and then compared.

Secondly, we believe that, in order to describe deprivation in terms of geography, individually considered partial indicators are not sufficient to capture the socio-economic conditions, but it is necessary to use a set of variables, or partial indicators, which better reflect the multidimensional nature of deprivation, through a kind of composition effect of negative aspects (Ivaldi et al. 2016; Ivaldi and Testi 2011).

With regard to the variables to be used, the choice of such indicators can be made by resorting to census surveys, to multi-purpose surveys based on samples of the population (Costa et al., 2004) and also to surveys specially prepared to study the index (Jarman, 1983; Gordon and Pantazis, 1997). However, we deem necessary the construction of two indicators on the basis of partial indicators currently available from official statistics and which do not require *ad hoc* surveys. This results in two advantages: avoiding the occurrence of additional costs and allowing to update the indicators in a simple and continuous way, basing decisions on objective and transparent data that are subject to an interpretation as unambiguous as possible. Hence, the preference for census data, which are in fact the most used by those who have attempted the construction of deprivation indicators (Jarman, 1983; Carstairs and Morris, 1991; Townsend, 1987; Forrest and Gordon, 1991; Benach and Yasui, 1999; Hales et al., 2003; Cadum et al., 1999; Valerio and Vitullo, 2000, Ivaldi et al., 2015).

Based on the literature, we decided to develop two indicators of deprivation: the first concerning material deprivation, through the study of direct variables; and the second related to social deprivation, calculated using indirect variables (Townsend et al., 1988).

Six variables were identified (Table 1) taken from Istat data, referring to each individual region and compared.

Three variables concerning material deprivation:

- X_1 = house ownership
- X_2 = unemployment rate
- X_3 = low education

Three variables concerning social deprivation:

X_4 = lone elderly people

X_5 = ethnic minorities

X_6 = single parents

Table 1.
The variables used
(Source: Istat 2014)

Indicator	Definition
House ownership	% of rented houses compared to total houses
Unemployment rate	Job seekers compared to total workforce
Low education	% of residents with a degree lower or equal to *licenza media inferior*
Lone elderly people	% of residents over 65 years old
Ethnic Minorities	% of foreigners out of total residents
Single parents	% single-parent households out of total households

In order to proceed with the construction of the indicators, after identifying the reference area to select the variables and build the indices, we proceeded according to the classic additive model, which represents the most used model in the literature.

The classic methodology used for the construction of a deprivation index aims to realize an index (Jarman, 1983; Carstairs and Morris, 1991; Townsend, 1987; Forrest and Gordon, 1993; Cadum et al., 1999; Valerio and Vitullo, 2000), consisting of the weighted (Jarman, 1983) or unweighted sum (Carstairs and Morris, 1991; Townsend, 1987; Forrest and Gordon, 1993; Cadum et al., 1999; Valerio and Vitullo, 2000) of the previously selected partial indicators.

If the variables present a considerable lack of homogeneity in terms of units of measurement, to avoid that someone has greater weight than the other, it is necessary to previously carry out a standardization of the variables (Bartley and Blane al., 1994).

The indicators are calculated in an additive manner, by adding the contributions of selected variables (Tables 3 and 4). As seen above, due to the lack of homogeneity in terms of units of measurement of the selected variables, it was considered necessary to carry out a standardization. The variables with different scales would in fact have a

different weight in the calculation of the total score compared to the other variables. Therefore, for each observation we calculated the z-scores for each of the variables under consideration, obtained by subtracting at each observation the value of the average of the regions and dividing the result by the standard deviation of the regions. The single index therefore consists of the sum of three unweighted z-scores (Carstairs and Morris, 1991; Townsend, 1987; Forrest and Gordon, 1993; Cadum et al., 1999; Valerio and Vitullo, 2000, Ivaldi and Testi, 2011).

The material deprivation index is calculated as the unweighted sum of the Z_i given that

$$Z_1 = \frac{x_1 - \mu x_1}{\sigma x_1} \quad Z_2 = \frac{x_2 - \mu x_2}{\sigma x_2} \quad Z_3 = \frac{x_3 - \mu x_3}{\sigma x_3}$$

and being μx_i and σx_i (i = 1, 2, 3) the averages and standard deviations of the variables under consideration for the area, the material index is equal to:

Material deprivation index $= \sum_1^3 Z_i$

Similarly, the social deprivation index is calculated as the unweighted sum of the remaining Z_i : given that

$$Z_4 = \frac{x_4 - \mu x_4}{\sigma x_4} \quad Z_5 = \frac{x_5 - \mu x_5}{\sigma x_5} \quad Z_6 = \frac{x_6 - \mu x_6}{\sigma x_6}$$

and being μx_i and σx_i (i = 4, 5, 6) the averages and standard deviations of the variables under consideration for the area, the social index is equal to:

Social deprivation index $= \sum_4^6 Z_i$

Estimated Results and Analysis

On the basis of previously analysed variables, the two respective deprivation indices were calculated. Positive values of the indices indicate situations of deprivation while, on the contrary, negative index values identify situations of well-being. Note that the indices are the sum of addenda that can be positive or negative and, therefore, may compensate for each other in some way.

The results obtained with the study of the index of material deprivation in the twenty Italian regions (*Table 2*) reveal a known

situation, in which the regions of Northern Italy enjoy a greater material well-being compared to the regions of Southern Italy and the Islands.

Table 2.
Material
Deprivation Index

Regions	Material Deprivation Index
Campania	4.78
Puglia	3.06
Sicilia	2.95
Calabria	2.10
Sardegna	1.60
Valle d'Aosta	1.27
Piemonte	0.71
Liguria	0.16
Lombardia	-0.90
Basilicata	-0.91
Molise	-1.02
Toscana	-1.07
Emilia-Romagna	-1.12
Trentino Alto Adige	-1.15
Veneto	-1.40
Lazio	-1.53
Abruzzo	-1.59
Marche	-1.83
Friuli-Venezia Giulia	-1.86
Umbria	-2.27

Table 2, however, highlights an unexpected point about this deprivation index: if it is true that the most deprived region is Campania (4.78), the least deprived is not a region in the north, but Umbria (- 2.27).

For a detailed analysis of the phenomenon, we may study the variables that make up the indicator (Table 3). It can be seen that the unemployment rate is lower in the regions of northern Italy such as Trentino Alto Adige (-1.40), Veneto (-1.05) and Friuli-Venezia Giulia (-0.87) and that it increases in the South and the Islands such as in Campania (1.45), Sicily (1.77) up to the highest rate in Calabria (2.08).

In Umbria, in fact, almost 70% of inhabitants aged between 15 and 64 have a qualified degree and above *licenza media* (only Lazio has a better percentage), there is a moderate unemployment rate and many residents live in owned homes.

Table 3. Variables that make up the Material Deprivation Index	House ownership	Unemployment rate	Low education
Piemonte	1.32	-0.42	-0.18
Valle d'Aosta	1.43	-0.69	0.53
Liguria	1.36	-0.62	-0.58
Lombardia	0.45	-0.90	-0.46
Trentino Alto Adige	1.18	-1.40	-0.93
Veneto	-0.10	-1.05	-0.25
Friuli-Venezia Giulia	-0.14	-0.87	-0.86
Emilia-Romagna	0.64	-0.91	-0.85
Toscana	-0.09	-0.62	-0.36
Umbria	-0.61	-0.38	-1.27
Marche	-0.74	-0.46	-0.64
Lazio	0.07	-0.11	-1.48
Abruzzo	-1.14	0.06	-0.52
Molise	-1.56	0.39	0.15
Campania	1.92	1.45	1.41
Puglia	-0.23	1.42	1.87
Basilicata	-1.30	0.25	0.13
Calabria	-0.84	2.08	0.86
Sicilia	-0.48	1.77	1.66
Sardegna	-1.15	0.99	1.77

It may be surprising that Valle d'Aosta has a fairly high material deprivation index, considering the fact that it is a region with special status and, thanks to the beauty of its territory, has a strong tourist attraction. In this case, if the data relating to rented houses contributes to position Valle d'Aosta in this position, the true source of material deprivation is observed in the qualifications lower or equal to the *licenza media*. This phenomenon is caused by the fact that upper secondary schools and the university, linked to the University of Turin, are often distant from students' residences and are difficult to reach because of the layout of the territory. Leaving school early can also be caused by job opportunities related to tourism (mountain guides, ski instructors, hotel industry, etc.).

The picture of social deprivation appears different, and the results may seem difficult to understand (Table 4).

Table 4.
 Social Deprivation Index

Regions	Social deprivation index
Lazio	2.93
Valle d'Aosta	1.37
Piemonte	1.17
Veneto	1.16
Toscana	1.02
Liguria	0.96
Emilia-Romagna	0.85
Abruzzo	0.57
Friuli-Venezia Giulia	0.32
Lombardia	0.32
Umbria	-0.07
Marche	-0.58
Calabria	-0.73
Trentino Alto Adige	-0.84
Campania	-1.38
Molise	-2.45
Sicilia	-2.88
Puglia	-2.94
Sardegna	-3.45
Basilicata	-4.35

In fact, while for material deprivation the regions most affected are those in the South and the Islands, with regard to social deprivation those same regions are among the least deprived: Basilicata (-4.35), Sardinia (-3.45), Puglia (-2.94) and Sicily (-2.88). To better understand these results, it is necessary to analyse the variables taken into consideration: some very socially deprived regions such as Lazio (2.93), Valle d'Aosta (1.37), Piemonte (1.17), Veneto (1.16) and Lombardia (0.32) are known for their well-being.

Also in this case, it is useful to analyse the situation resulting from the decomposition of the indicator in the initial variables (Table 5).

Lombardia is the second region of Italy, after Emilia-Romagna, to have the highest proportion of foreign residents in the total population. This is because foreigners choose to live where there are greater job opportunities as in Lombardia and Emilia-Romagna. As for Sicilia, which appears different from the other regions of the South with respect to this variable, it has to be noted that a large number of foreigners is in reception centres for migrants and only a few live elsewhere in the region. Another observation concerns the variables of elderly people

living alone and single-parent households. The North and South have often very different traditions and cultures, and this factor influenced the analysis of social deprivation; in particular, the element of the traditional family affects the variables of elderly people living alone and single parents. As for elderly people, we note the clear difference between the North and the South: the regions which still keep a strong sense of attachment to the family have very low rates of lone elderly people (Molise, Sardegna) and thanks to these factors they show low social deprivation. As for the variable of single-parent households, it is noted that the number of families with only one parent is higher in the regions of Northern Italy, because there are more divorces compared to southern regions where, as already mentioned, a higher sense of family unity exists. As already known, Lazio represents an exception with the highest value of single-parent households.

Table 5.
Variables included in the index of social deprivation

	Lone elderly	Ethnic minorities	Single parents
Piemonte	1.29	-0.35	0.22
Valle d'Aosta	2.04	-1.40	0.73
Liguria	0.73	-0.75	0.97
Lombardia	0.72	0.44	-0.85
Trentino Alto Adige	0.65	-0.54	-0.95
Veneto	1.49	0.04	-0.37
Friuli-Venezia Giulia	0.96	-0.71	0.07
Emilia-Romagna	1.04	0.75	-0.94
Toscana	0.98	-0.01	0.05
Umbria	0.97	0.36	-1.39
Marche	0.82	-0.43	-0.97
Lazio	1.00	0.07	1.86
Abruzzo	1.63	-1.83	0.77
Molise	0.03	-3.21	0.73
Campania	0.81	-3.11	0.92
Puglia	1.29	-3.46	-0.77
Basilicata	0.85	-3.36	-1.84
Calabria	1.10	-2.71	0.88
Sicilia	1.02	-3.24	-0.66
Sardegna	-1.42	-3.54	1.51

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The proposed indicators require a stricter validation than the evidence of facts. In order to quantify more precisely the material and social deprivation in the different regions it was decided to correlate these indicators with the life expectancy at birth.

According to the definition of the 2015 Report on fair and sustainable well-being by ISTAT (Rapporto BES 2015), the life expectancy at birth expresses the average number of years that a child can expect to live when born. The better the conditions of life of an individual, the lower the index of deprivation is expected to be and, consequently, the higher the life expectancy.

Table 6.
Material deprivation index and life expectancy at birth

Material deprivation		Life expectancy at birth	
Index	Regions	Regions	Age
-2.27	Umbria	Trentino Alto Adige	81.2
-1.86	Friuli-Venezia Giulia	Marche	81.0
-1.83	Marche	Emilia-Romagna	81.0
-1.59	Abruzzo	Toscana	81.0
-1.53	Lazio	Umbria	80.9
-1.40	Veneto	Lombardia	80.8
-1.15	Trentino Alto Adige	Veneto	80.8
-1.12	Emilia-Romagna	Puglia	80.5
-1.07	Toscana	Piemonte	80.2
-1.02	Molise	Abruzzo	80.2
-0.91	Basilicata	Friuli-Venezia Giulia	80.1
-0.90	Lombardia	Liguria	80.1
0.16	Liguria	Lazio	80.0
0.71	Piemonte	Basilicata	79.9
1.27	Valle d'Aosta	Valle d'Aosta	79.7
1.60	Sardegna	Sardegna	79.7
2.10	Calabria	Molise	79.7
2.95	Sicilia	Calabria	79.6
3.06	Puglia	Sicilia	79.5
4.78	Campania	Campania	78.5

As regarding material deprivation, Table 6 shows that the most deprived regions are also those with the shortest life expectancy at birth: Campania provides such an example, with the highest deprivation index (4.78) and also the lowest life expectancy (78.5 years). By making the comparison from a statistical point of view through the Pearson correlation coefficient, which varies between -1 (in the presence of perfect inverse correlation) to 1 (in the presence of perfect direct

correlation), it is possible to provide a measure of the link between the material deprivation index and life expectancy at birth (Table 7).

Table 7.
 Pearson Correlation between material index and life expectancy at birth

		Life expectancy at birth
Pearson Correlation	Material Index	-0.698(**)
Sig. (2-tailed)		0.001
N		20
** Correlation is significant at the 0.01 level (2-tailed).		

The high value of the correlation coefficient shows how strong the link between the index and the test variable is, so we can observe that material deprivation can be considered a proxy for health, although there is a part that is not explained by deprivation - otherwise the correlation coefficient would be equal to -1 – and is also affected by other social factors and behaviours that are beyond material deprivation (Fuchs, 2004). In fact, in this case the correlation between material deprivation and life expectancy has a value of the coefficient equal to -0.70, which means that it has a functional link equal to 70% compared to the relationship of perfect linear association. This relationship has a negative sign because, as previously mentioned, material deprivation and life expectancy are inversely correlated.

From these observations we can state that material deprivation, in areas where it has high indicators, affects health and therefore reduces life expectancy.

As regarding the comparison between social deprivation and life expectancy, we notice fewer elements in common than in the previous analysis. There is not a close relationship between life expectancy and social deprivation, as Table 8 shows.

The Pearson correlation coefficient, calculated between social deprivation and life expectancy, has a value of 0.325 (Table 9). It is close to 0 and so the two variables appear to be poorly correlated.

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Table 8.
Social Deprivation Index and life expectancy at birth

Social deprivation		Life expectancy at birth	
Index	Regions	Regions	Age
-4.35	Basilicata	Trentino Alto Adige	81.2
-3.45	Sardegna	Marche	81.0
-2.94	Puglia	Emilia-Romagna	81.0
-2.88	Sicilia	Toscana	81.0
-2.45	Molise	Umbria	80.9
-1.38	Campania	Lombardia	80.8
-0.84	Trentino Alto Adige	Veneto	80.8
-0.73	Calabria	Puglia	80.5
-0.58	Marche	Piemonte	80.2
-0.07	Umbria	Abruzzo	80.2
0.32	Lombardia	Friuli-Venezia Giulia	80.1
0.32	Friuli-Venezia Giulia	Liguria	80.1
0.57	Abruzzo	Lazio	80.0
0.85	Emilia-Romagna	Basilicata	79.9
0.96	Liguria	Valle d'Aosta	79.7
1.02	Toscana	Sardegna	79.7
1.16	Veneto	Molise	79.7
1.17	Piemonte	Calabria	79.6
1.37	Valle d'Aosta	Sicilia	79.5
2.93	Lazio	Campania	78.5

Table 9.
Pearson Correlation between Social Index and life expectancy at birth

		Life expectancy at birth
Pearson Correlation	Social Index	-0.325(**)
Sig. (2-tailed)		0.001
N		20
** Correlation is significant at the 0.01 level (2-tailed).		

Social deprivation does not appear to be particularly linked to life expectancy, and this suggests that we seek a further test variable suitable for the validation of the index of social deprivation. In the present study, we opted for the composite index of security (BES 2015). This index contains indicators inherent to both the objective dimension of security, such as the rates of house theft, pickpocketing and robbery, and the subjective dimension of security, identified by the indicator of perceived security (*Murders were not included in the study of the Composite Index of Security because of the relevance and specificity that characterizes them and the very changing trend they had over the years.*) The correlation between the social deprivation index and the composite index of security presents a Pearson correlation coefficient of -0.47 (Table 10),

which means that the functional link is equal to about 50% compared to the relationship of perfect linear association.

Table 10. Pearson Correlation between Social Index and composite index of security

	Composite index of security
Pearson Correlation Social Index	-0.465(**)
Sig. (2-tailed)	0.001
N	20
** Correlation is significant at the 0.01 level (2-tailed).	

This correlation value, although not very high in the proper statistical sense of the term, highlights the presence of a rather important "context effect" (Macintyre et al., 2002; Kawachia et al. 1999), because it is evident that the area of social deprivation is also affected by other variables in addition to those examined. As seen for the material deprivation index, also in this case there is an inverse correlation, because the higher the security (investigated in theft, pick-pocketing, robberies and road safety), the lower the social deprivation.

It is possible to obtain a further validation by analysing the Spearman's rank correlation with the two indices of deprivation. In fact, this coefficient indicates the degree of correlation of the variables according to their ranking in their indices. The more similar are the rankings, the more the index will approach 1 (Table 11).

Table 11. Spearman's Correlation between Material index and Social Index

	Social Index
Spearman Correlation Material Index	-0.358(**)
Sig. (2-tailed)	0.001
N	20
** Correlation is significant at the 0.01 level (2-tailed).	

The Spearman correlation coefficient is negative and quite low, showing a slight inverse correlation between the two indices. This strengthens and supports the initial hypothesis of the work, according to which deprivation is a multidimensional concept that has different characteristics depending on whether it is material or social, thus justifying the need to build two separate indicators.

Conclusions and Policy implications

The aim of this study was to verify whether the material and social deprivation indices are two distinct indices, and subsequently to analyse the correlations with the test variables. We divided deprivation in its two material and social components and, after validating them with life expectancy, we assumed we would get different results. Deprived living conditions do not necessarily imply the presence of the ''victims'' of social exclusion

This hypothesis was confirmed by the fact that life expectancy is related mainly with material deprivation, unlike social deprivation, which has a low value for the index of correlation with life expectancy. Social deprivation appears to be related inversely with the composite index of security, thus showing that the higher the security (investigated in theft, pick-pocketing, robberies and road safety), the lower the social deprivation.

The proposal for decision-makers in the social and health fields is therefore to use the index to integrate present criteria for resource allocation so that it is more consistent with actual socioeconomic risk situations on a regional basis. It is worth mentioning that an allocation of resources that takes into account these differentials could meet not only ethical requirements aimed at increasing equity, but also mere efficiency requirements: the removal of obstacles to express oneself at one's best, in the meaning of Sen's capability approach (Sen 1987), actually allows for the removal of obstacles to economic development as well.

Joint intervention and cooperation among regional, health and municipal administrations are of increasing necessity in order to arrange effective, integration systems of various types of services; social, health and combined social-health care. In this framework, deprivation indicators could be a suitable means of highlighting the potential welfare burden of an area and the need for social aid, thus analyzing the aspects of social-health integration between the municipalities and public health service providers (Sheldon and Carr-Hill 1992; Brenna 2007)

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