A NEW APPROACH FOR DETERMINING MINIMUM HOUSING EXPENDITURES WITHIN THE ABSOLUTE POVERTY LINE IN ITALY

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Abstract. The approach to measure absolute poverty adopted by the Italian National Statistics Institute (Istat) involves identifying essential needs of households and then calculate the monetary value of a basket of goods and services deemed sufficient to meet these basic needs. Such an approach needs to be revised periodically to take into account changes in basic needs and the availability of new data sources for defining needs and costs. In this paper we present a refined methodological approach to estimate housing needs, which is a relevant component to the poverty line. By using two new and reliable data sources, a census of all rental contracts as well as data on minimum heating requirements, the revised methodology enhanced poverty estimates in two ways. First, it increased the overall precision of the poverty line estimate, since the minimum housing expenditure needs were calculated using exogenous information rather than endogenous information gathered by the survey used to assess poverty condition. Second, the new data sources allowed for increased territorial detail, further factoring geographical cost-of-living differences in the estimation process.

1. The minimum housing needs in the Italian poverty absolute approach

In 2009, the Italian National Statistics Institute (Istat) developed a methodology to calculate the "minimum acceptable household expenditure" for measuring absolute poverty (Istat, 2009; Freguja and Polidoro, 2024; Cutillo *et al.*, 2023 under the assumption that consumption expenditure collected through Household Budget Survey (HBS) was a good proxy to measure living standards in Italy. The approach to measure absolute poverty adopted by the Istat is a twostep process. It begins by identifying essential needs of households and then it calculates the monetary value of a basket of goods and services deemed sufficient to meet these basic needs. By comparing household expenditure with this monetary value (i.e. the poverty line), the poverty status of the household is defined.

Although poverty in developed countries has often been estimated using a relative approach, Istat also adopted the absolute approach since relative poverty reflects inequality more than the lack of resources of households (Darvas, 2017). For developed countries, the absolute poverty line should be seen as a kind of "minimum

acceptable" standard of living given the socio-economic environment in which households and individuals live. Hence, to estimate absolute poverty lines in developed countries, researchers should first identify what the essential needs for a decent life in any given country are, and then define a basket of goods and services that meet these needs. Then, the basket should be converted into a monetary value leading to the poverty line, below which a household is deemed to be poor.

Poverty lines in Italy were set by identifying three main pillars defining what basic needs are: (i) consumption of adequate food, (ii) housing needs and (iii) other basic needs. While these needs are deemed to be homogeneous in the microeconomic theory (e.g., Varian, 2010; Deaton and Muellbauer, 1980), at household level they tend to vary due to the demographic composition of the households. For example, two families of equal size are likely to have different food needs depending on whether children or elder people live in that specific households. In addition, commodity prices and the related cost-of-living tend to vary depending on the geographical location of households. Thus, the monetary value of the absolute poverty line varies depending on the household composition (age and number of household members) and the area of residence (geographical location of residence and demographic size of the municipality).

According to the 2009 methodology, the consumption bundle consisted of three expenditure components: (i) food and beverages, which refer to the concept of adequate food; (ii) housing, which refers to the availability of a dwelling of an adequate size according to the size of the household, also including expenses related to lighting, heating, cooking, access to hot water and some other durable goods; and (iii) a residual component, encompassing a minimum expenditure for clothing, communication, information, transport, education and health. In 2021, (before the methodology was refined), the housing component represented 41.1% of the average poverty threshold, while the food and drink component and the residual component were respectively equal to 35.9% and 22.9% of the poverty line[1].

As already mentioned, the definition of housing needs included the expectation that families should have access to a suitable-sized dwelling based on the number of household members. Additionally, it was expected that households could pay for home heating and other essential services and few other durable goods. The housing component was further disaggregated into three sub-components as follows: the rent component (77.8% of the housing component), the energy component (20.9%) including heating, electricity, cooking and hot water, and the durable goods component (1.3%).

[1] As the threshold is differentiated according to household composition and area of residence, these values are obtained with respect to the average threshold of the weighted sample in 2021, i.e. with respect to the average household threshold according to the Italian population and households' characteristics in 2021.

The absolute approach to poverty needs to be revised periodically to take into account changes in basic needs and the availability of new data sources for defining needs and costs. In November 2021, Istat set up an Inter Institution Scientific Commission on Absolute Poverty with the aim of revising the absolute poverty methodology, which completed its work in 2023. In revising the calculation of the housing component, as well as the methodology as a whole, the Commission agreed that the theoretical framework was still a valid one. However, it was decided to update the methodology with new data sources and, where necessary, to revise the minimum requirements and the models implemented to estimate housing needs.

By using two new and reliable data sources, a census of all rental contracts provided by the Italian Revenue Agency as well as data on minimum heating requirements (Faiella *et al.*, 2017), the proposed methodology enhanced poverty estimates in two ways. First, the absolute approach requires poverty lines to be calculated independently of the number of households in society that do or do not meet certain conditions (Sen, 1983). Thus, poverty lines should ideally be established to the greatest extent possible through exogenous sources rather than using the expenditure distribution of the population of interest obtained by HBS data, in order to avoid the risk of introducing elements of relativity in an absolute approach.

Second, using the census information on rental contracts and a more disaggregated heating minimum requirements certainly adds a substantial level of territorial detail to the poverty line estimation, further counting for geographical cost-of-living differences. Indeed, a household is deemed to be poor if its expenditure is below the poverty line. However, the expenditures of households as recorded by the HBS, as well as the monetary assessment of minimum needs, are influenced by the cost of living in the geographic area where the households are located. This variability is evident in Italy, which exhibits significantly different patterns in the consumer price indexes at the regional level (Istat, 2023). Therefore, in order to ensure the same minimum level of living standards, two families with similar socio-economic characteristics may encounter higher or lower expenses based on their region of residence. As a result, poverty thresholds should accurately mirror these disparities in the cost of living to the greatest extent possible.

In the revision of the methodology, the rental threshold and the energy threshold have undergone to substantial revisions. The approach to the durable goods component has instead remained unchanged, and entails the calculation of depreciation allowances for specific durable good based on their minimum cost and estimated lifespan (Istat, 2009).

The new methodology for calculating the poverty line was implemented using 2022 HBS onwards. The poverty lines of Italy were retrospectively reconstructed over the 2014-2022 period using specific price indices (Brunetti *et al.*, 2024). In the

rest of the paper, the differences between the old and the new methodology are assessed through the 2021 year as the reference period, the most recent year for which monetary thresholds are available using both methodologies.

The rest of this article is structured as follows: Section 2 outlines the construction of the rental sub-component, detailing the 2009 methodology, the utilization of a new database, and the updated methodology for estimation. Section 3 presents a novel approach to computing the energy component, incorporating newly obtained heating data used in the analysis. Lastly, Section 4 provides an in-depth discussion of the main results, comparing the old and new methodologies, and offers concluding remarks.

2. The rental component of the housing threshold

As already mentioned, the rental sub-component represents the largest part of the housing component[2]. The estimation model (Istat, 2009; Cutillo, 2023) was based on a suitable dwelling floor area, which varies according to household size, and a unit price per square metre of the dwelling. The suitable size, i.e. the basic need, was defined by the minimum housing requirement, which was set out in a Ministerial Decree (MD) describing the conditions enforced to grant habitability (Ministerial Decree 5/7/1975). The main criteria to establish the minimum dwelling floor area (i.e. the suitable size) is the household size of a family. The criteria defined in the MD was amended by the Istat methodology to take into account the lack of small dwellings in Italy by replacing point estimates with floor area intervals, and then central value of the intervals was used as the minimum floor area by household size (Table 1). For example, the Decree parameter 28 for a single member household was replaced with the 28-37 square metre interval, and the central value of the interval (32.5 sqm) was used in the estimation process[3].

[2] Rents are usually included in the calculation of the poverty line also for homeowners and for families occupying dwellings provided to them for free. Indeed, household expenditure also includes imputed rents, i.e. a rental price which is imputed for those households occupying a dwelling without paying any rent, corresponding to what they would have to pay, at current market prices, if they had to live in a dwelling with similar characteristics to the dwelling in which they actually live (Ceccarelli *et al*., 2009). The inclusion of imputed rent in income and consumption is internationally recommended for studies on poverty, inequality and the distribution of income and consumption (Canberra Group, 2001).

[3] In a future revision of the methodology, it might be useful to adjust the regulatory references on minimum size with parameters that can also take into account certain needs (e.g., reading, studying, internet connections…) that go beyond the basic needs of fresh air and spatial mobility, and that could also be differentiated based on the age of the household members.

Table 1 – *Minimum floor area of the dwelling by household size (squared metres).*

	Household size					
	1	2	3	4	5	For each extra member
MD 1975	28	38	42	56	66	+10
Floor area intervals	28-37	38-41	42-50	56-60	66-70	+10
Suitable size	32.5	39.5	46	58	68	+10

Source: Ministerial Decree 5/7/1975 and Istat (2009)

The monetary value of the rent component was obtained by multiplying the suitable dwelling floor area by the estimated monthly expenditure on rents per square metre. The monetary value of the rent component for a household of size *z*, residing in the geographical area *k* and in a municipality of type *c* was defined as:

$$ac_z^{kc} = spl_z \cdot \widehat{cm}^{kc} \tag{1}$$

where spl_z is the suitable dwelling floor area for a household of size *z* and $\widehat{cm}^{kc}$ is the estimated monthly expenditure per square metre for rent of households residing in the type *c* municipality of geographical area *k*.

The parameter $\widehat{cm}^{kc}$ was estimated through the following model based on HBS 2003-2005 data:

$$cm^{kc} = b_0^c \cdot \exp\left(-sp^{b_1^c + b_2^c d}\right) \tag{2}$$

where *sp* is the dwelling floor area and *d* is a dummy variable which takes value 1 if the household is resident in the South or Islands and 0 otherwise. Such a model takes into account territorial variability for three types of municipality (Metropolitan area - centre; Metropolitan area suburbs and municipalities with at least 50,001 inhabitants; Other municipalities until 50,000 inhabitants) and two geographical areas (Centre-North; South and Islands), as well as the fact that the cost per square metre decreases as the size of the dwelling increases.

2.1. The new estimation methodology for the rental component

In reviewing the methodology to estimate the rental component, Istat faced two major challenges. First, it was important to verify whether alternative criteria were available to identify minimum dwelling floor area needs and, second, if new data sources were available and could be used to refine the 2009 methodology in the calculation of the cost per square metre.

With respect to the first issue, since 1975 MD was still in force, the minimum dwelling floor area requirement were set as described in Table 1.

With respect to the second issue, Istat used the database of real estate leases of the Revenue Agency (*Banca dati delle locazioni immobiliari dell'Agenzia delle Entrate* - hereafter also referred to as the OMI database), which is a census database of all rent agreements currently in place in Italy. This database has improved the estimation of the housing component for three main reasons. Firstly, it is an administrative data source which is fully exogenous to the HBS data; secondly, since it is a census database, there is no need to estimate expenditure on rents econometrically, thus avoiding the uncertainty arising from the choice of an econometric model. Finally, census data allows for a higher level of geographical disaggregation.

Indeed, it is worth mentioning that the 2009 methodology was based on an econometric model using HBS data. In this respect, the estimated coefficients made the methodology somewhat endogenous relative to the consumption expenditure distribution gathered by household survey data. In addition, coefficient estimates might vary depending on the model chosen by the analysist. Therefore, it was decided to avoid econometric methods to estimate the rent unit price per square metre but rather it was calculated by disaggregating the available information by dwelling floor area, territorial domain (geographical area at NUTS II level - regions) and type of municipality. Given the use of the OMI data base, this means that rents were stratified by Region (Italy has 20 regions), municipality type and dwelling floor area classes (the classes are the same as in Table 1). The unit price per square metre was determined by the median unit price per square metre surface in every cell.

A rigorous selection of leases is applied before stratification. Only long-term contracts (4+4 years and 3+2 years) were considered in the analysis. These are rent agreements for residential use that are usually ended. On the contrary, all short-term contracts, such as for study or for holiday purposes, were excluded. In addition, we excluded luxury dwellings[4] from OMI database since not relevant for households at the lower tail of the consumption expenditure distribution.

The monetary value of the rent component for a household of size *z*, residing in the region *k* (20 modalities) and in a municipality of type *c* is now defined as:

$$ac_z^{kc} = spl_z \cdot \widehat{cm}_z^{kc} \tag{3}$$

where spl_z is still the suitable dwelling floor area for a household of size *z* as presented in Table 1, and $\widehat{cm}_z^{kc}$ is the related unit price per square metre for each

[4] Luxury dwellings are identified through the Land Register and are villas, fine dwellings and dwellings of historical or artistic significance.

suitable dwelling floor area for a household of size *z* residing in the type *c* municipality of region *k* (i.e., the median value of the cell *zck*).

The spatial variation is quite large, both in terms of the type of municipality and regional location, as displayed in Table 2. Furthermore, the data display a well know inverse relationship between the rent unit price per square metre and the dwelling floor area. The unit price ranged between 1.68 euro per square metre for large dwellings[5] in the small municipalities of Calabria to 17.14 euro per square metre for the smallest dwellings in the large municipalities of Lombardy (i.e., Milan).

These figures confirmed the opportunity of obtaining the monetary value of rental needs by means of a finer classification of the geographical area rather than the two macro areas used in the previous methodology.

Table 2 – *Euros per square metre for the evaluation of the rent component. Maximum and minimum values by type of municipality.*

NUTS I	Municipality demographic size		
	Metropolitan area – centre	Metropolitan area suburbs and municipalities with at least 50,001 inhab.	Other municipalities until 50,000 inhab.
	Maximum		
Value	17.14	12.16	9.83
Region	Lombardia	Toscana	Toscana
Dwelling size (sm)	28-37	28-37	28-37
	Minimum		
Value	3.61	2.44	1.68
Region	Sicilia	Calabria	Calabria
Dwelling size (sm)	146+	146+	146+

2.2. An assessment of changes in the rental component

Table 3 shows the average rental thresholds based on rent unit prices stratified with the OMI database and compares them with the results obtained with the methodology established in 2009. Overall, on 2021 HBS data, the rental threshold levels obtained with the new methodology are consistent with thresholds calculated with the 2009 methodology. At national level, the average rent threshold was

[5] The minimum housing requirement for households with 13 members or more has been set at 148 square metres. The corresponding size class for finding the median reference value is dwellings of 146 square metres and over (see Table 1). Anyway, households with more than 12 members have not been sampled in the Italian HBS since 2014.

virtually the same (336 vs. 333 euro per month). However, the refined methodology increased the geographical variability of the minimum rental values and even more so when disaggregating the data by municipality type. For example, when using the OMI census data the average rental sub-component is equal to 403 euro in the Centre compared to 388 euro in the same area when using the past methodology. At municipality level, the average rent threshold for large municipalities stands at 464 euro when using the OMI data, while it is 62 euro lower (402 euro) when calculating it based on the previous methodology. In particular, the average values for large towns in the Centre (Rome and Florence) is 24.4% higher using the OMI census data (551 vs 443). Given that the previous methodology was based on estimates calculated over survey data, and the econometric model only adopted six geographical areas, it is evident that the model had flattened the estimates for the different geographical areas around the average. Moreover, the model was based on 2003-2005 data, and the yearly revaluation of the threshold was obtained through specific price indices. It is also likely that the annual revaluation has not captured the major changes in the housing market in recent years (e.g. the strong increase in the value of small dwellings and dwellings in large cities compared to large dwellings and dwellings in small towns).

Table 3 – *Average rental threshold by geographical area and municipality demographic size. Old and new methodology.*

NUTS I	Municipality demographic size			
	Metropolitan area – centre	Metropolitan area suburbs and municipalities with at least 50,001 inhab.	Other municipalities until 50,000 inhab.	Total
	New methodology			
North-West	467	380	318	**367**
North-East	505	384	335	**362**
Center	551	384	316	**403**
South	309	270	219	**244**
Islands	313	284	238	**266**
Italy	**464**	**347**	**290**	**336**
	Past methodology			
North-West	427	391	335	**371**
North-East	428	388	337	**360**
Center	443	400	343	**388**
South	294	270	223	**245**
Islands	293	268	222	**249**
Italy	**402**	**352**	**299**	**333**

Note: The calculations are based on the 2021 Italian Household Budegt Survey (HBS).

3. The energy component of the housing threshold

In the previous methodology, the energy component was determined by combining the expenses for heating (which also included energy costs for both hot water and cooking) with electricity costs. However, significant changes have occurred, starting from the fact that the portion of energy expenditure allocated to hot water and cooking has transitioned from being calculated alongside heating costs to being calculated alongside electricity costs.

3.1. The heating component

Given the absence of available sources to establish the minimum heating requirement, a linear regression model was employed using data from the HBS (Istat, 2009). This model incorporated fuel expenditure necessary for heating the residence, heating water and cooking as the dependent variable. It was specifically tailored for households residing in dwellings equipped with independent heating systems or individual appliances. The model utilised estimated coefficients to estimate the heating threshold for all surveyed households and was based on factors such as dwelling size, geographical location (North, Center, and South), and household member characteristics.

3.2. The new estimation methodology for the heating component

For the revision of the heating component, Istat had the opportunity to use recent research on energy poverty conducted in Italy (Faiella and Lavecchia, 2015; Faiella *et al.*, 2017; Faiella and Lavecchia, 2021). Specifically, Faiella *et al.* (2017) estimated heating demand (in terms of physical energy) for 140 typical buildings, categorized by climatic zone, construction period, and type (villa, apartment, etc.). The physical energy demand is estimated according to the European standard EN 15251, which incorporates guidelines from the World Health Organization (WHO) to prevent temperature-related health issues in homes. This standard classifies expected comfort levels from heating into three categories: High level (20.5°C), Medium level (18.6°C), and Minimum acceptable level (17.5°C). As the focus is on minimum heating requirement, the authors model heating demand to achieve an acceptable level of comfort, adopting a temperature of 17.5°C. Subsequently, the physical energy requirement was linked to the HBS data using variables such as climate zone (determined by the municipality of residence), dwelling type, and construction period. The required kWh per square metre is multiplied by the size of

the households' dwellings in the HBS sample to determine the energy demand in physical units. Finally, the results are calibrated using the national heating demand. The monetary value of the heating needs is obtained using Eurostat's average unit costs of natural gas, the most used energy vector for heating in Italy.

Once the monetary value of heating needs for the households in the HBS sample is acquired through this highly detailed estimation (climate zones are finely disaggregated)[6], Istat only needed to obtain coefficients aligned with the absolute poverty methodology. These coefficients transform the estimates derived from dwelling types into estimates that enable differentiation based on household composition and geographical location.

The following linear regression model is therefore used:

$$pe = \alpha + \beta \cdot sp + \sum_{k=2}^{5} \gamma_k \cdot d_k + \sum_{i=2}^{3} \zeta_i \cdot t_i + \sum_{j=1}^{7} \delta_j \cdot z_j \quad (4)$$

where *pe* is the minimum expenditure for heating identified through the Faiella *et al*. (2017) methodology. *sp* is the dwelling size, d_k are the dummies for the geographical area at NUTS I level, t_i are the municipal type dummies, and z_j are the number of components for 7 age groups. The model is estimated using a pooled sample covering the period from 2014 to 2019 (with prices up to 2019). This extensive sample is employed to accommodate the variation in minimum expenditure requirements over the years due to different weather conditions. It aims to establish a sort of minimum necessary consumption level based on the average temperature recorded over the years. Notably, the estimates by Faiella *et al*. (2017) incorporate the temperature trends observed over the various years.

The heating threshold is derived from the coefficients estimated by the equation:

$$cr_i^k{}_{z_1,\dots,z_7} = \hat{\alpha} + \hat{\beta} \cdot spl_z + \hat{\gamma}_k + \hat{\zeta}_i + \sum_{j=1}^{7} \hat{\delta}_j \cdot z_j \quad (5)$$

where $cr_i^k{}_{z_1,\dots,z_7}$ is the threshold for a generic household of size *z* (with $z_1, \dots, z_7$ components for each age group) residing in a generic *k* (5-mode, NUTS I level) area and in a generic type of municipality *i*. In the transformation we use again, as with the rent component, the suitable size of the dwelling spl_z.

The revision of the heating component has markedly improved the estimates in two crucial ways. Firstly, by adhering to the European standard EN 15251 and WHO guidelines, it offers a precise determination of the minimum heating requirements essential for avoiding health problems. Secondly, the data source is external to the

[6] Special thanks due to Ivan Faiella and Luciano Lavecchia for providing the estimates for the HBS waves 2014-2019.

HBS data. In this regard, it's important to highlight that the minimum requirements could be harmonized with different surveys[7], and alignment with the HBS has solely facilitated the acquisition of coefficients that are consistent with the absolute poverty methodology.

3.3. The electricity component

In the previous methodology, electricity demand was determined based on the minimum requirement (measured in kWh) for illuminating the house and operating major household appliances (such as the refrigerator, washing machine, and TV). The basis for this minimum requirement stemmed from a 1993 study, later endorsed by the Energy Authority in 2003. In this study, the minimum requirement was determined based on the household's size. The corresponding monetary value was then derived using prevailing tariff prices.

3.4. The new estimation methodology for the electricity component

The study utilized by Istat (2009) is significantly outdated and has not been replicated. Moreover, there have been no recent studies of a similar nature available[8]. Due to substantial shifts in the energy market and technological advancements over the years, the Inter-Institution Scientific Commission on Absolute Poverty has chosen to estimate the minimum requirement using survey data instead of relying on an outdated external source. This estimation process involves utilizing a model in which electricity expenditure, also including expenditures on cooking gas and hot water, acts as the dependent variable.

$$gl = \alpha + \beta \cdot sp + \sum_{k=1}^{15} \gamma_k \cdot d_k + \sum_{j=1}^{7} \delta_j \cdot z_j \qquad (6)$$

where gl is the expenditure for electricity, hot water and cooking[9]. The other variables have the same meaning as in the heating model.

[7] Under the condition that the matching variables are present in the survey.

[8] The study aimed to implement tiered tariffs based on energy consumption, with the assumption that low-income households would consume less. This approach intended to provide support to poor households by offering reduced tariffs to those consuming below specified thresholds. However, this strategy was later discarded in favor of energy subsidies with eligibility criteria unrelated to consumption levels.

[9] The survey questionnaire includes various details regarding the types of fuel utilized, heating methods, mechanisms for accessing hot water, and cooking practices. Often, this comprehensive information enables the breakdown of total energy expenditure into heating, electricity, and cooking/hot water expenditures. In cases where such disaggregation isn't feasible, energy expenditure is allocated using Eurostat's Physical Energy Flow Accounts

The threshold is then obtained as:

$$cgl_{i\ z_1,\ldots,z_7}^{k} = \hat{\alpha} + \hat{\beta} \cdot sm_z + \hat{\gamma}_k + \hat{\zeta}_i + \sum_{j=1}^{7} \hat{\delta}_j \cdot z_j \quad (7)$$

where *cgl* is the threshold for electricity, hot water and cooking gas.

Similarly to the heating estimation, the electricity estimation is carried out using a pooled model on HBS data from 2014 to 2019. The model is applied to a limited sample, consisting of households with electricity and hot water facilities in the dwelling, as well as a refrigerator, washing machine, and TV. Instead, households with a dishwasher and/or air conditioning are excluded to ensure consistency with the 2005 definition of electricity (energy usage for refrigerator, washing machine, TV, and lighting) and to prevent other highly energy-intensive appliances from influencing expenditure[10].

3.5. An assessment of changes in the energy component

As previously mentioned, the minimum expenditure necessary for cooking and heating water has been moved from the heating sub-component to the electricity sub-component. Consequently, an evaluation of the differing outcomes can only be made on the total energy component. Table 6 presents a comparison of the total energy component using both the previous and revised methodologies.

Nationally, the energy threshold increases from 89 to 112 euros per month on average. This rise is primarily attributed to a likely underestimation of the former heating component. Interestingly, the values obtained for the heating component remain similar, hovering around 64 euros per month, even though in the previous methodology the demand for cooking and water heating was calculated together with heating, whereas now it is calculated alongside electricity.

The new methodology, like to the previous one, reveals notable territorial disparities due to varying climates across the country. Small municipalities in the North-East and large municipalities in the Islands consistently exhibit the highest and lowest energy demands, respectively. However, an important observation is the shift from a roughly constant average threshold by type of municipality to a differentiated one based on municipality type. This appears to be a significant and

(PEFA), which categorize household energy usage based on end-use. For further details on the PEFA: https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Energy_consumption_in_households

[10] In a future revision of the methodology, it might be useful to ask whether the refrigerator, washing machine, and TV are actually the only electrical appliances that should be considered essential, or if others could be considered. For example, can the dishwasher (and its energy consumption) still be considered non-essential today? Or, in an era of significant climate change, should we consider only the heating needs of the home, or also the cooling needs?

reasonable outcome. Large cities are predominantly located in plains or coastal areas and experience milder climates compared to small municipalities, also dispersed throughout mountainous regions. This important result is due to the fact that, in the old methodology, the territorial reference for the heating component was to 3 geographical areas and for the electricity component it was national. In the methodology presented in this paper, instead, the reference for both components is to 5 geographical areas, also divided into 3 types of municipality.

Table 4 – *Average energy threshold by geographical area and municipality demographic size. Old and new methodology.*

NUTS I	Municipality demographic size			
	Metropolitan area – centre	Metropolitan area suburbs and municipalities with at least 50,001 inhab.	Other municipalities until 50,000 inhab.	Total
	New methodology			
North-West	113	117	137	**126**
North-East	116	119	140	**132**
Center	97	99	118	**106**
South	77	80	99	**91**
Islands	72	77	98	**87**
Italy	**99**	**102**	**121**	**112**
	Past methodology			
North-West	100	106	107	**106**
North-East	100	105	109	**107**
Center	95	99	100	**98**
South	57	60	58	**59**
Islands	56	58	56	**56**
Italy	**88**	**89**	**89**	**89**

4. Discussion and conclusions

In November 2021, Istat set up an Inter Institution Scientific Commission on Absolute Poverty with the aim of revising the absolute poverty methodology, which completed its work in 2023. Following the absolute approach to poverty, it is necessary to identify households' essential needs and then calculate the monetary value of a basket of goods and services sufficient to meet these basic requirements. Recognizing that needs may evolve over time, the methodology must be periodically updated to ensure precision and incorporate new databases for more accurate poverty

thresholds estimation. In this paper, we have described the revision of the housing component of the absolute poverty lines in Italy.

In addressing the housing component, Istat has used two new and reliable data sources: a census of all rental contracts and data on minimum heating requirements. These new sources have contributed to enhancing poverty estimates in two significant ways. Firstly, they have increased the overall precision of the poverty line estimate by utilizing exogenous information rather than predominantly relying on endogenous data gathered from the HBS itself. Secondly, they have facilitated greater territorial detail in incorporating geographical cost-of-living differences into the estimation process.

Regarding the first point, the absolute approach necessitates the calculation of poverty lines independently of household expenditure distributions obtained from survey data. Indeed, relying on survey data for estimating minimum needs may introduce relative elements into an absolute approach, as was the case with the previous methodology.

In the previous methodology, only 7.3% of the average housing threshold was sourced from exogenous data (limited to electricity and durable goods requirements), while the remaining 92.7% was derived through elaborations on HBS data. The new estimation method increases the percentage of exogenous sources to 89.6%, incorporating rent, heating, and durable goods data. The remaining 10.4% is derived from HBS data elaborations for calculating needs related to lighting, cooking, and hot water.

Regarding the increased territorial detail of estimates, variations in commodity prices across different areas within a country impact both households' expenditures and expenditures for minimum needs. Therefore, it is crucial to tailor the poverty line to the specific cost-of-living conditions of each area. The use of census information on rental contracts and more disaggregated heating minimum requirements significantly contributes to this increased territorial detail.

In the revised methodology, the finest territorial reference is at the NUTS II level (Italy comprises 20 regions), which accounts for 74.2% of the average threshold due to rental needs. The territorial reference to five zones (North-West, North-East, Centre, South, and Islands) represents 24.6% of the average threshold, attributed to total energy requirements overall. Additionally, the territorial reference to four zones (North-West, North-East, Centre, South) contributes only 1.2% of the average threshold, due to durable goods.

In contrast, in the old methodology, the 3-mode NUTS I level (North; Centre; South and Islands) was the finest territorial reference in the assessment of basic needs[11]. The 3-mode level accounted for 16.2% of the average threshold. The

[11] As the assessment of basic needs and their monetary valuation relied predominantly on the three-mode distribution, or even more aggregated territorial levels, disparities between regions were solely attributed to

territorial reference to 2 modes (Centre-North; South and Islands) represented 77.8% of the average threshold, attributed to rent requirements. The territorial reference was at the national level for the remaining 5.9% of the average threshold, attributable to electricity.

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variations in the distribution of households by household type and municipality type across different regions. Notably, values for the same household type within the same type of municipality remain consistent across all regions belonging to the same geographical area. For instance, the threshold for a couple aged 18-59 residing in a small municipality consistently amounts to 435 euros per month in all northern regions. This is why, until now, estimates of absolute poverty have been released with a maximum territorial detail at the NUTS I level. Currently, a study is also being conducted to assess the feasibility of releasing regional estimates.

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