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PREFACE

Francesco Maria Chelli

The subject to which this Special Issue is dedicated, absolute poverty, is a societal ill that demands ongoing efforts to generate the essential knowledge necessary to formulate policies aimed at counteracting and eradicating it.

Official statistics have done their part to shed light on the structural features of poverty. Over the past two decades, we have been able to monitor its different dimensions, precursors and manifestations, through a set of fine indicators of the socio-economic conditions of households. The main pieces of a mosaic that can be put together for an integrated reading of the living conditions of households and their evolution include indicators on income, living conditions and poverty risk (from the EU-SILC survey), measures of spending behavior, absolute poverty and relative poverty (from the household budget survey), indicators on consumer price trends to measure the impact of inflation on household groups, researchs for estimating infra-national purchasing power parities. This composite image provides policymakers with essential knowledge, thus enabling them to formulate multidimensional, profiled and dynamic interventions.

The statistical measures need to be continuously improved, expanded, and made more and more reliable.

For this reason, Istat is engaged in a continuous methodological endeavour, including the Inter-Institutional Scientific Commission on Absolute Poverty, established in 2021. The Commission, initially chaired by President Prof. Gian Carlo Blangiardo and later by me, involved experts from Istat, the Ministry of Economy and Finance (MEF), the Bank of Italy, the Council for Agricultural Research and Analysis of Agricultural Economics (CREA), the Internal Revenue Service and several universities.

The debate that emerged within the Commission raised complex conceptual issues (for example, the definition of poverty, the measurement of welfare, and the reference budget) and extended the reflection on the measurement of absolute poverty to the latest multidimensional approaches. It also encouraged a shift away from a view exclusively based on monetary expenditure data, with a careful look also at the other components of well-being.

Therefore, the presentation of the new methodology is also an opportunity to reflect on future developments and make recommendations that will help outline the way forward.

To all the members of the Commission, who have supported and nurtured this project, sharing their expertise, professionalism and passion, goes my and our gratitude.

At the heart of our commitment is the awareness that poverty in the third millennium is an unworthy inheritance and an intolerable shame, that must be defeated. The tools to know this phenomenon in all its dimensions are a prerequisite to eradicate it.

Francesco Maria CHELLI, Presidente ISTAT, francesco.chelli@istat.it

INTRODUCTION TO THE SPECIAL ISSUE ON "NEW APPROACHES FOR MEASURING POVERTY: STUDIES AND PERSPECTIVES"

Andrea Brandolini, Chiara Gigliarano, Matteo Mazziotta

Over the last decades, poverty has been a most relevant topic in socio-economic research. In particular, the measurement of poverty has stimulated a vivid debate among researchers from different fields: economists, philosophers, sociologists, and statisticians.

For more than eighty years, the Italian Society of Economics, Demography and Statistics (SIEDS) has focused on these issues by promoting a multidisciplinary scientific debate and welcoming the research ideas of scholars with different skills and professional experiences. Motivated by this interest, SIEDS has promoted this special issue of the *Rivista Italiana di Economia Demografia e Statistica* entitled "New approaches for measuring poverty: studies and perspectives".

This special issue collects several contributions on cutting-edge research questions in the study of poverty. It includes methodological analyses, empirical works, critical reviews as well as reflections on conceptual and definitional aspects of poverty measurement. All in all, this special issue provides valuable insights into the new challenges that are emerging in poverty measurement.

The issue builds on the work of the "Inter-institutional Scientific Commission on absolute poverty" established by Istat over the years 2022-2024. The Scientific Commission was assigned the task of analysing the methodology for estimating absolute poverty originally developed and routinely applied by Istat (Istat 2009), with the specific aim of verifying its validity in the current economic and social context. The Commission, chaired by the President of Istat, included experts from Istat, the Ministry of Economy and Finance (MEF), the Bank of Italy, the Council for Agricultural Research and the Analysis of Agricultural Economics (CREA), the Revenue Agency and several universities.

Italy is the only European Union (EU) country to have an official statistic of absolute poverty. At the EU level, the definition of a measure comparable across Member States has been investigated within the joint pilot initiative between the DG Employment, Social Affairs and Inclusion and the Joint Research Centre, "Measuring and monitoring absolute poverty, ABSPO" (Menyhért et al. 2021). This project, launched in 2018 and completed three years later, emphasised the many relevant challenges in designing an EU-wide absolute poverty line, but also proposed

implementable methodologies. Until now, however, it has not brought to changes in official poverty measurement at the EU level. To our knowledge, Switzerland is the only other country in Europe that adopts an absolute standard (Ufficio Federale di Statistica 2024); and of course the United States remain the major exception among advanced countries in relying on an absolute official measure dating back to the 1960s, though accompanied by the Supplemental Poverty Measure since 2011 (Shrider 2024). Hence, an in-depth reflection on the various facets of the measurement of absolute poverty in Italy should be of general interest.

The thirteen papers published in this special issue offer an interesting overview of the topic. They start from the discussions of conceptual and methodological issues by Chiara Saraceno (page 9) and Cristina Freguja and Federico Polidoro (page 21).

The Italian methodology for estimating absolute poverty is based on three main components of the poverty basket: Valeria de Martino, Lorenza Mistura and Raffaela Piccinelli (page 49) illustrate the food component, Andrea Cutillo (page 65) the housing component, and Ilaria Arigoni (page 81) the residual component. Federico Di Leo and Isabella Corazziari (page 97) discuss methods to account for quantity-related savings in good purchases, while Alessandro Brunetti, Stefania Fatello, Orietta Patacchia, Rosabel Ricci (page 111) and Francesco Altarocca, Cristina Dormi, Stefania Fatello, Carlo Matta (page 123) examine new data sources for improving poverty estimates.

The last part of the special issue broadens the analysis. Luigi Biggeri (page 139) considers possible future developments, while Luigi Biggeri and Monica Pratesi (page 157) suggest exploiting the regional absolute poverty thresholds for computing sub-national purchasing power parities. Massimo Aprea, Michele Raitano, Eleonora Romano, Pietro Zoppoli (page 173) introduce the multi-dimensional perspective by exploring how absolute poverty is correlated with energy poverty as well as with low work intensity. Federico Polidoro (page 189) brings into the picture the international dimension by sketching the evolution of extreme poverty over the last 30 years in different geographical areas around the world. Lastly, Vito Peragine and Giovanni Vecchi (page 199) provide a critical re-examination of Istat's approach to the measurement of absolute poverty.

We think that this special issue contributes to the literature on poverty measurement by shedding lights on existing methods but also stimulating the reflection on future developments. We hope that this issue may inspire further research in the academia as well as national statistical institutes on theories and methodologies for measuring absolute poverty.

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CONCEPTUAL AND METHODOLOGICAL ISSUES IN DEFINING AND MEASURING ABSOLUTE POVERTY

Chiara Saraceno

Abstract. The notion of absolute poverty recalls that of basic needs, which, however, is far from having a consensual meaning. The author first discusses two main contrasting definitions of basic needs - one based on an idea of pure subsistence, the other based on human rights and the capability approach. The author then outlines the conceptual and methodological issues involved in intra- and cross country as well as over time comparison. In the final paragraph, the author suggests that in order to overcome the limitations of any poverty measure that ignores intra- and cross-country differences in access to human and social rights and in the availability of common goods, the author suggests that survey-based data on income or consumption should be integrated with data on selected functionings at the individual and household level (e.g., education, health, housing), which in turn should be contextualized based on the national and local availability and accessibility of public goods that are defined as essential for supporting those functionings.

1. Introduction

Absolute, or extreme, poverty and how to measure it until recently have been considered an issue concerning exclusively developing countries. Within the developed, particularly Western countries the focus has been rather on relative poverty, although with the important exception of the United States. This choice is based on the idea that, in these countries, extreme lack of means of subsistence had been largely overcome at least since the post-World War II years, due to the combination of economic development and welfare state arrangements. Furthermore, as noticed by Blank (2008), who criticized the US approach on this ground, absolute poverty lines typically lag behind the average living conditions in rapidly growing economies, an argument that is becoming important also at least in some of the developing countries. The reference point for assessing poverty from a relative perspective, therefore, is not pure subsistence but the average level of living. Following Townsend (1962, 1979), relative poverty concerns the inability to adequately participate in the society one lives in for lack of adequate resources. The EU indicator of "at risk of poverty" (AROP) is also based on the relative poverty concept.

In recent years, however, some dissatisfaction with this concept has emerged, for different reasons. One concerns its comparability when countries with great differences in level of living are involved. This is particularly true when relative poverty is expressed, as in the EU indicator, in terms of percentage (50% or 60%) of mean or median national income. A poverty line set at 50% or 60% of mean or median national income, in fact, does not always indicate a similar, or comparable, situation across countries and it risks representing as non-poor individuals and households in one country who would be severely poor in another. In order to overcome this paradox and adequately assess and compare levels of poverty, a common standard must be identified and its value translated in PPS, as suggested by Atkinson (1998, see also Atkinson et al. 2002). Two other reasons for the partial dissatisfaction with the concept and measurement of relative poverty concern instead its efficacy in actually detecting and measuring poverty. In addition to being very sensitive to the economic conjuncture (see e.g. Jenkins et al. 2013), it seems rather a measure of inequality than of straightforward poverty.

Because of this dissatisfaction, there has been an effort to integrate the measurement of relative poverty with other indicators. At the EU level, Eurostat has developed a multidimensional indicator of at risk of poverty or social exclusion (AROPE) which, alongside relative income poverty, includes living in a low work intensity household and suffering severe material and social deprivation. This last sub-indicator may be understood as a, partial, indicator of absolute poverty in so far it is based on a number of goods and consumptions, lack of access to a number of which (7 out of 13) is defined as severe deprivation. Furthermore, with the Measuring and Monitoring Absolute Poverty (ABSPO) project, the European Commission and Eurostat have assessed not only the feasibility, but the opportunity to integrate the present indicators and ways of measuring poverty, with an absolute monetary poverty measure that represents constant or comparable purchasing power over commodities across countries and time periods (European Commission, 2021). At present, however, within the EU member countries only Italy since 1997 has an official absolute poverty measure alongside the relative one.

2. Different approaches to defining absolute poverty

The notion of absolute poverty recalls that of basic needs, which, however, is far from having a consensual meaning. Different understandings and definitions of what are basic needs, and what are the goods needed to satisfy them, may result in different definitions, and measures, of absolute poverty.

Within the international debate we, may find two main contrasting definitions of basic needs. The most consolidated, but also simpler, definition is based on a concept

of pure subsistence. It defines absolute poverty as the lack of sufficient resources to secure basic life necessities, including amongst others safe drinking water, food, or sanitation. Not surprisingly the term absolute poverty thus defined is often interchangeable with that of extreme poverty. The most extreme use of this definition may be found in the World Bank estimates of the incidence of poverty across the world, where the international extreme poverty line is based on the lines of the group of poorest countries. According to this definition, are absolutely or extremely poor those who live with less of the equivalent in PPS of 2.15 dollars a day at 2017 prices. In 2020, its value was € 1,39 a day in Italy, €1.41 in Portugal, 7.49 yuan in China, 22.49 pesos in Mexico, 355.18 naira in Nigeria. The amount is so low that even those who are a little above it may experience difficulty in surviving, not to say live decently and with dignity. It should be noted, however, that, following recommendations by Atkinson (2017), the World Bank is now also reporting estimates based on a 'societal poverty line' which combines absolute and relative elements (World Bank, 2018).

Other exercises that share a "survival" concept of absolute poverty are the International Food poverty line proposed by Kakwani and Son (2006), the Minimum Income for Healthy Living proposed by Morris and others (2000), the international poverty measurement proposed by Allen (2017) as conceptually and methodological superior to that of the World Bank. All these attempts struggle with the issue of what is needed to "survive" in a given time and society, and not merely live "hand to mouth". In this perspective, it is worthwhile remembering that the very initiator of the absolute poverty approach, Rowntree (1937), in constructing the basket of essential goods in 1930s UK, included also tea and tobacco, which did not have any nutritional and healthy-wise value, but were psychologically and socially important for English men at the time. Rowntree forcefully argued that "working people are just as human as those with more money. They cannot live 'on a fodder basis'. They crave for relaxation and recreation just as the rest of us. But … they can only get these things by going short of something which is essential to physical fitness, and so they go short." (Rowntree 1937, pp. 126-127).

This opinion seems to be shared by all attempts to define absolute poverty lines in the developed countries, in so far, as pointed out also in the final ABSPO Report, they refer to benchmarks well above pure subsistence and include the accessibility to consumptions that are considered not only desirable, but necessary in a given country.

The second main definition of absolute poverty is based on the Human rights and capabilities approaches (although there is some difference between the two). It therefore conceives absolute poverty as the inability to reach minimum acceptable levels in the fundamental rights, or functionings (Sen, 1992; Tiraferri, 2008). These, of course, include nutrition, health (including also infant mortality protection),

shelter, but also education, dignity and above all the possibility to choose what kind of life to have; thus, they also include the degree to which human rights are granted or on the contrary infringed upon. Severe constraints in accessing education, health care, the regular labour market, lack of protection from exploitation, high inequalities in the risk of infant mortality depending on one's position in the social stratification and/or (for instance in Italy with regard to infant mortality; see De Curtis and Simeoni, 2021) region of residence – all these dimensions are perceived as important as the economic condition in determining absolute poverty and should be taken account of when measuring it. Towards this end, Alkire and Foster (2011) have developed a general measure of multidimensional poverty based on dimensions included in the Human development Index. Their approach has been implemented in the construction of the Multidimensional Poverty Index (MPI) by the Oxford Poverty and Human Development Initiative (,) and the United Nation Development Programme for their joint Annual Report on Global Poverty (OPHI/UNPD 2023).

The British New Economic Foundation (NEF) Think tank, as well, proposes a rights-based poverty line (RBPL) that is based on the estimated relationship between income and wellbeing indicators, which refer to distinct economic and social rights. The minimum threshold for each indicator is universal, but the needed income to achieve it varies across countries. Interestingly, this proposal suggests that the role of the availability of public goods in reaching and eventually overcoming the poverty threshold in a given dimension should be taken account of, although without clear methodological indications (New Economics Foundation, 2010).

Atkinson and Bourguignon (1999) have proposed an integration between the two main definitions of absolute poverty and underlying basic needs, distinguishing between two levels of capabilities. The first one refers to subsistence, the second to social functionings. According to these two authors, however, the first level refers to absolute poverty, the second to relative poverty. Sen, on the contrary, argues that achieving a minimum level of social functionings is also necessary in order to have a life with dignity. The impossibility to achieve this minimum level, therefore, represents a form of absolute poverty. Relativity, according to Sen, concerns only the resources needed to adequately "function" and achieve a minimum acceptable level of capabilities, since they vary depending on the context. "Being in good health", or "having the necessary minimum of education" are absolute needs, with the same status as, for instance, access to clean water, shelter, clothing and food. But the definition of thresholds and the actual means to achieve them depend on available hygienic, health and school infrastructures in a given context."The characteristic feature of 'absoluteness' is neither constancy over time, nor invariance between different societies, nor concentration merely on food and nutrition. It is an approach of judging a person's deprivation in absolute terms rather

than purely relative terms *vis à vis* the levels enjoyed by others in the society" (Sen 1985, p. 673). He therefore proposes to define poverty in terms of capability failure: "the failure of basic capabilities to reach certain minimally acceptable levels" (1992, p. 109).

Doyal and Gough (1991) with their concept of "combined capabilities" and "intermediate needs" have further worked with this idea of universal basic needs to make it more helpful for social policy. Combined capabilities and intermediate needs do not exist as an abstract potential but are mediated by material resources. In Doyal and Gough's words (1991, p. 157), they are "the crucial bridge between universal basic needs and socially relative satisfiers". The object of evaluation, from the point of view of the assessment of poverty, are not needs, or capabilities, in the abstract, but the availability of and access to combined capabilities or intermediate needs (such as, for instance, adequate nutritional food and water, adequate protective housing, basic education, reproductive freedom).

The United Nations in 1995 adopted a definition of absolute poverty that aims at combining a survival and a human rights-based approach, as well as an absolute and relative perspective. In this definition, absolute poverty is characterised as "severe deprivation of basic human needs, including food, safe drinking water, sanitation facilities, health, shelter, education and information". It is related to social services as well as income. It is part of, but distinguished from, a broader notion of "overall poverty". This latter refers to the total number of people living in poverty in a country since they lack a number of goods and/or opportunities, which range from "lack of income and productive resources sufficient to ensure sustainable livelihood" to "increased morbidity and mortality from illness", to "social discrimination and exclusion", "lack of participation in decision-making and in civil, social and cultural life" (UN, 1995, par. 19). It should be noted that the "father" himself of the relative poverty approach, Townsend, was involved in drafting this definition and in the ensuing campaign for a global social floor (Yeates and Deacon, 2011).

The definition of minimum living standard as adequate participation in society proposed by the cited EU sponsored ABSPO project also may be considered as belonging to the human rights and capability approach. As the Report underlines, in fact, it is consistent with the widespread view of social participation as a summary indicator of both individual well-being and the fulfilment of one's social rights (Kahneman et al., 1999; Lister, 2004, 2014), as well as with a poverty measurement that focuses on individuals' effective freedom, agency and attainable societal roles in explaining material and social deprivation (Sen, 1985, 1987; Nussbaum, 2000). Furthermore, the concept of adequate social participation is generic and flexible enough for the needs of international measurement where countries of different socio-economic backgrounds are compared.

The final ABSPO Report, however, admits that "The concept of adequate social participation is somewhat elusive and needs to be made operational through a series of practical measurement choices. These should clarify what social participation means, how adequacy is defined, and where the boundaries of the relevant society are drawn in each particular context" (European Commission 2021, p. 33). And it adds: "There is no agreement on these topics in the theoretical literature: many alternative concepts of social integration and participation are used simultaneously, while the study of social adequacy and societal boundaries provides little effective guidance for practical measurement" (Ibidem).

3. Context specificity: conceptual and methodological problems

As Ravallion pointed out some years ago (2016), we may observe a growing compatibility between indicators of absolute and relative poverty precisely because of the awareness of the context specific quality of absolute poverty indicators.

Context specificity, however, raises issues of cross-country, intra-country and cross-time comparability. There may be a more or less important cross-country variability both in the way "fundamental needs" are perceived and in the means to address them even within a group of countries belonging to the same political and institutional space. The difficult consensus on the list of "deprivations" for the AROPE indicator within the EU and the (political) impossibility to rank them testify both the different starting points and the diverse cultures characterizing these countries. Even calculating the cost of a comparable budget may be difficult, as it emerges in the interesting experiments of developing comparable "reference budgets" across the EU (e.g., Cantillon et al., 2019). In order to calculate their economic value, *de facto*, either average prices at the national level or the prices in one or more cities within each country are considered, ignoring within country variation, which may be significant, particularly concerning housing, but also transportation and, in the case of the rural/urban divide, even food.

Comparability across time must also address the issue of variability of how "fundamental needs" are perceived and framed as well as changes in the means to address them. The higher level of literacy and schooling required over time in order to obtain a job and move competently in society, easier access to clean water, up to tap water, changes in housing and communication technologies - these and other changes may push in absolute poverty those who cannot access them, not only because they cannot reach the new minimum adequate level of living, but because these changes impact also on resources that were previously available, reducing or eliminating them. Fountains where one might wash her/his laundry disappear. Today this is happening also with public phone boxes. Rabbits and chickens can no

longer be raised domestically unless one lives in a rural setting. Spaces for subsistence agriculture diminish and self-building one's own house in open "free" spaces impossible or illegal. Until the mid-1960s, in Italy, ownership of a laundry machine and refrigerator was an indicator of a good economic status. Today, lack of them may be an indicator of severe deprivation. Analogously, in the 1950s and 1960s, one might live decently without a (traditional) phone. Today a cell phone and internet access are required even for applying for social assistance when poor.

It should be noted that the only developed country that uses exclusively the absolute poverty approach, for its official estimates, the US, takes account of variation over time only with reference to inflation, that is of variations in the cost of a basket of goods that has remained the same since 1960. In Italy, instead, also the "basket of essential goods" has been revised, first in 2009 and then again in 2022.

The concept of absolute poverty underlying the Italian measurement method (see the methodological note in ISTAT 2023 and the contributions to this Special Issues of the *Rivista Italiana di Economia Demografia e Statistica*), that is how the basket of goods has been individuated, goes beyond that of subsistence for two reasons. First, it is multidimensional and not driven exclusively, as the US one, by the food component. Second, it is carefully contextualized in time and social space with regards to the goods that it considers as necessary. It may not, however, be considered as based on the capabilities or human rights approach. Expenditure for consumption, in fact, although more adequate than income to assess the level of wellbeing or deprivation, reflects only the cost of goods and services, but it ignores the variability in the availability of public and private services as well as of other important contextual dimensions (e.g., environmental quality, security, labour market opportunities) that impact on the quality of life of individuals and households (Brandolini, 2011; D'Alessio, 2018). Scarcity or absence of early child education and care services, of full-time schools, an inefficient health service, lacking and/or inefficient public transportation, lack of parks and public playgrounds, pollution, living in insecure neighborhoods – all these may substantially reduce the quality of life of the poor. Furthermore, they may differentiate the poor living under these circumstances with regard to the capacity to satisfy their basic needs not only from those who are better off, but also from individuals and households who have the same economic conditions, but live in regions, municipalities that have a better dotation of public goods and in neighborhoods that are more secure and not polluted.

4. The unresolved issue of how to take account of the value of public goods: the need for a new approach

Whether and how to include the presence or absence of public goods and their value, not only in economic, but also in wellbeing terms, raises both comparative and methodological problems, when looking at the individual and household, not societal level. It would require a detailed analysis of national and sub-national contexts on the availability, distribution, rules of access to various kinds of public goods on the one hand of whether and to what degree individuals and households have actual access to them depending on their economic and social circumstances.

For instance, when first ISTAT started measuring absolute poverty, it did not include expenditure for health based on the fact that, in principle, in Italy access to health services is universal. Later, however, it decided to include also this kind of expenses not only because the National Health services introduced users' fees, but also because of an increasing recourse to private health services. Yet, the question remains open on, first, whether, where, to what degree this recourse is dictated by lacking or inefficient public services, second, what happens when lack of public services may not be compensated with out-of-pocket expenditure because of insufficient economic means. "Health poverty" simply remains invisible. The same happens with childcare services and full day schools (which include also cafeteria services). These public goods not only are not offered on a universal basis but are also quite unevenly distributed across the national territory (ISTAT, 2020). Thus, many households and their children do not have the "choice" to use them. This scarcity, in turn, tends to strengthen the well-known phenomenon of children of dual worker, well educated, middle-high class parents disproportionally using these services, even when they are public, compared to single earner, low income and low educated parents (Pavolini and Van Lancker, 2018). Similar reasoning may be applied to the availability of other public goods, such as parks, transportation, accessible sport facilities, public libraries and so forth

Even the indicators proposed by the ABSPO project do not include the availability of, and access to, public goods. Yet, as Lanau et al. (2020) observe: "Where universal provision of basic services is lacking, current approaches to poverty measurement may result in underestimates, thereby raising comparability and identification issues".

Baldini and others (2014) some years ago, suggested to take account of the role of public goods in contributing to the wellbeing of individuals and households by imputing their estimated value. But, even if this solution were theoretically adequate, which is at least controversial, it requires beforehand to know whether the considered public goods are actually accessible and under what conditions to the individuals and households to whom that value is imputed.

Finding a solution to these issues is simple neither at the methodological nor at the conceptual level. The cited Multiple Deprivation Index, adopted to assess the incidence of poverty at the global, regional, national and subnational level goes partly in this direction (OPHI/UNPD, 2023). The deprivation profile for each household and person in it is constructed through measuring 10 indicators concerning not only standard of living, as in most measurement using some kind of reference budget, but also health and education of each household member and particularly of children. These indicators, that may be adapted for countries at different level of development, allow to measure poverty in functionings. They seem efficacious not only in assessing the different incidence and intensity of poverty across countries, but also intra-country differences, although more so for developing than for developed countries. Integrating reference budgets, or basket of goods, with detailed data on health (including access to needed health services/interventions), education and possibly also other dimensions (e.g., social networks, quality of the environment, social participation) seems therefore a promising improvement.

Indicators on functionings, however, do not allow to verify whether cross and intra-country differences depend only on differences in the level and distribution of income or also on the availability of public goods. One way to address this issue might be to reconstruct different national and local contexts, based on the availability and accessibility of public goods that are defined as essential for promoting adequate functionings. It would then be possible to set, and understand, the microdata on functionings in their specific context.

Both operations require, of course, a great deal of methodological and financial investment, as well as the precise individuation of the required socio-geographical scale. This latter may vary depending on whether the focus is cross-national or intra-national. Such an investment is essential for effective policy making and at least nearing the 2030 Sustainable Development goal of drastically reducing poverty. As the 2023 Global Multidimensional Poverty Index Report reminds, already in the 2017 Report of the Commission on Global Poverty to the World Bank (Atkinson, 2017), Tony Atkinson echoed then–World Bank President Jim Yong Kim's observation that "Collecting good data is one of the most powerful tools to end extreme poverty" and affirmed the pledge "…to do something that makes common sense and is long overdue: to conduct surveys in all countries that will assess whether people's lives are improving." (OPHI/UNPD 2023, p. 3).

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THE CONCEPT AND MEASUREMENT OF POVERTY

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Abstract. This paper has a twofold aim. On the one side, without the presumption of being exhaustive, it tries to give a general overview of the different approaches and measures of poverty, and, on the other side, it focusses the attention on the absolute poverty indicators, describing the most important innovations introduced in the Italian methodology by the Scientific Commission established at beginning of 2022. Therefore, after a general introduction, the second paragraph mainly discusses the multiple dimensions of poverty and the approaches to provide a measure of these dimensions (relative and absolute poverty, income and consumption-based measures, the role of wealth, the importance of investigating hard to reach population and the subjective poverty). In paragraph three, an overview of the Italian measures of poverty in the European context is given, by describing the European Union Statistics on Living Conditions (EU-SILC) indicators and those compiled relying on national Household Budget Survey (thereof those about absolute poverty). In the fourth paragraph the attention is addressed to describe the Italian methodology to estimate absolute poverty, focussing on the recent innovations introduced. Paragraph five discusses the use of income instead of consumption in the context of Italian methodology. Finally, some concluding remarks are traced, raising specifically the issue of the nonmonetary components in the estimation of absolute poverty and the related challenges for the future research work in the Italian context.

1. Introduction

The analysis of the living conditions of a population raises theoretical and methodological questions that are difficult to resolve. They all revolve around the same point: what individual's well-being is, and how it is measured. The answer is complex and concerns firstly the definition of the space of measurement on which to apply the empirical analysis and secondly the choice of the concrete methods of estimation (Brandolini and Saraceno, 2007, p. 23-60).

The approaches that limit the analysis of levels of well-being to material aspects have been contrasted by approaches that underline the need to investigate the dimensions that have to do with the freedom, rights, and capabilities of individuals (Rawls, 1971; Sen, 1992). However, the difficulties associated with measuring these intangible spheres of daily life explain the more frequent use of objectively

observable and measurable indicators on a well-defined scale, such as income, consumption expenditure and wealth. Analyzing living conditions according to a multidimensional approach, considering a plurality of non-monetary indicators, does not at all exclude the use of traditional monetary indicators, that indeed continue to be recognized as having a fundamental informative power which cannot be ignored. The difference lies in the role that the monetary aspect plays in the traditional univariate approach and in the multidimensional one. In the first approach, income or consumption expenditure or wealth constitute the only relevant domains with the implicit presumption that, through these variables, all the material aspects of well-being can be considered. In other words, it is hypothesized that there is such a high correlation between one and the others, so that the loss of information due to the use of a single variable is negligible. In the second approach, however, the aforementioned a priori hypothesis is abandoned, but income or consumption expenditure continue to play a central role although no longer exclusive and its degree of correlation with other well-being factors measured through non-monetary indicators can be assessed a posteriori on empirical basis.

Poverty measurement and analysis are crucial components of the screening of the living conditions of a population and as such also they can be conducted following different approaches, thereof each gives different and meaningful keys to understanding this phenomenon.

2. The multiple dimensions of poverty and their measures

Poverty has been defined in different ways and it is not the aim of this contribution to go through all of them but that we can summarize all as related to “a matter of deprivation” (Sen, 1981, p. 22). It means that there are several ways to define and to measure it. These ways represent not only different ways to collect and analyse statistical data, but also lead to distinct approaches in fighting against poverty. In developing countries, poverty can indicate absolute deprivation, which denies the fulfilling of basic needs and violates fundamental rights, while in developed countries poverty can indicate relative deprivation, the inability to afford the standard of life enjoyed by a reference group with higher incomes.

2.1 Relative and absolute approach to measuring poverty

Poverty, hunger, inequality, together with the climate change, are just some of the big challenges in today's world we need to address urgently. Numerous references to people's well-being and to a fair distribution of the benefits of

development are presented as indispensable components among the sustainable development goals (SDGs)[1]. Specifically, incidence of relative and absolute poverty are fundamental indicators for monitoring two of the 17 goals set by the 2030 Agenda for Sustainable Development (Goal 1, "No poverty - End poverty in all its forms everywhere", and Goal 10, "Reduce inequalities - Reduce inequality within and among countries").

Within a variety of possible approaches, poverty is generally measured according to two main ones: the absolute and the relative approach, depending on the underlying concept of poverty and on the consequent way to estimate the thresholds (in absolute or relative terms). To the two traditional ones, the indicator of societal poverty, aimed at combining absolute and relative measures, has been designed by the World Bank to give a more comprehensive measure of poverty that overcome the division between absolute and relative concepts.

Concerning absolute poverty, it is broadly agreed that it is no longer referred to as a concept of survival. Absolute poverty is mainly meant as inability to meet basic needs, typically defined by the nutritional ones with component of nonfood basic needs (Ravallion, 2016), and absolute measures of poverty are defined in real terms across time and space. Following this approach, the World Bank has established absolute International Poverty Lines (IPLs) that allow to compare the situation of different countries over time, also considering different clusters of countries identified by income level (low, lower-middle, and upper-middle-income countries). These lines in 2017 purchasing power parities are now equal to 2.15 US dollars of daily consumption a day for the first group (low-income), 3.65 US dollars for the second group (lower-middle income) and 6.85 US dollars (upper-middle-income).

Relative poverty measures households/people with an equivalent disposable income/consumption below a certain threshold and it is mainly meant as the lack of resources to participate adequately in one's society as it progresses. It is defined in relation to the overall distribution of expenditure or income in a country that, in their turns, depend on the economic cycle and, in the first case, also on the level and structure of prices. This makes the comparison among indicators complex both in terms of time and of different national realities. While absolute poverty refers to the resources a person must secure to maintain a "minimum standard of living", relative poverty is concerned with how well off an individual is in comparison to other residents in that country, which does not necessarily imply a low standard of living. In theory, therefore, while an absolute poverty line is a measure that should,

[1] The 2030 Agenda for Sustainable Development, adopted by all United Nations Member States in 2015, provides a shared blueprint for peace and prosperity for people and the planet, now and into the future. At its heart are the 17 Sustainable Development Goals (SDGs), which are an urgent call for action by all countries - developed and developing - in a global partnership (https://sdgs.un.org/goals).

adjusting by price evolution, remain stable over time, a relative poverty line is one that could be expected to shift with the overall standard of living.

Societal poverty (Jolliffe and Beer Prydz, 2021) is an indicator introduced by the World Bank in more recent years (2018) and it is aimed at capturing in one measure both the concepts of absolute and relative poverty. IPLs are derived from the national poverty lines, and they mean that, for each group of countries, if someone lives on less than those lines, this must be considered poor. But if identifying the same basic needs across countries ensures equality in the bundles of goods across countries, this equality may not result in the same level of wellbeing. A basic social activity (as the participation in the labor market) has a cost in poor countries, lower than that in the richer ones. To overcome this issue, a poverty line that keeps functioning the same across countries may result in a poverty line with varying levels of consumption. The societal poverty line (SPL) was introduced to this aim, and it is given as max (2.15 US dollars, 1.15 US dollars + 50% of median consumption or income) in 2017 PPP and as such combines an absolute component (the predefined poverty line $2.15) with a relative one (50% of median consumption or income). If someone is poor in absolute terms, is also poor in terms of societal poverty. In very poor countries the societal poverty will coincide with the absolute poverty threshold (2.15 US dollars), because 1.15 US dollars + 50% of median consumption or income is lower than 2.15 US dollars. In the more advanced economies, a person who suffers societal poverty, might not be poor in absolute terms because 1.15 US dollars + 50% of median consumption is strongly higher than the IPL. As such, societal poverty enables also providing a measure of inequality.

Estimates of absolute poverty rates (and recently of societal poverty) in a comparable manner across the countries are indeed regularly produced by the World Bank, whereas relative poverty indicators at national level are compiled and disseminated in most part of the advanced economies with harmonized approaches as is the case European Union Statistics on Income and Living Conditions (EU-SILC) program and the At Risk of Poverty indicator (AROP). National measures of absolute poverty are compiled mainly in low- and middle income- countries and in a small number of high-income ones, thereof Italy, together with US, Canada.

2.2 Income and consumption-based measures of poverty

In general, the measures of poverty based on monetary variables, consumption expenditure and income, take as their premise that the same level of expenditure/income corresponds to the same level of well-being. Current income is a measure of household economic resources which also depend on income allocation choices. A weak correlation with consumption may derive from the fact that

households can save part of their income or allocate it to the purchase of goods and services that do not fall within the definition of consumption expenditure. In addition, by falling back on capital of household or thanks to economical support of informal networks, low levels of disposable income may not result in levels of consumption expenditures similarly low. Income may also present significant fluctuations over time (as it happens to the income of self-employed or seasonal workers), which do not reflect a similar variability in terms of available resources. In fact, at any given time, the standard of living of a household depends more on permanent income than the current one (Friedman, 1957; Modigliani, 1966). In addition, consumption is influenced by allocation decisions or preferences (Coudouel *et al*., 2002; Meyer and Sullivan, 2010) and the propensity to consume varies with the family life cycle.

In other words, a greater use of income for consumption by some households may lead to less poverty when consumption variable is chosen over income; on the contrary, the moderate lifestyles of some population groups can lead to higher levels of poverty if calculated on consumption rather than income.

The choice between consumption and income as point of reference for the analysis of poverty therefore remains partly open, and it is quite the comparison between the two aggregates that provides the most informative contribution. The availability of statistical sources and their characteristics then become crucial to properly analyse the phenomenon (Freguja and Pannuzi, 2007).

2.3 Income, consumption, and wealth

The measures of poverty based on income or on consumption expenditure do not consider real and financial wealth, except for the resulting income flow. However, individuals can also rely on the possession of tangible and intangible assets to cope with the needs of everyday life and to face unexpected events. The role of wealth in supporting households' consumption recently and clearly emerged during the Covid-19 pandemic when the flows of current labour income were suddenly stopped, in particular for the self-employees, by the abrupt interruption of a lot of productive activities, playing the role of a "safety net", able to contrast unexpected negative events. Therefore, it is largely agreed that it is important considering wealth not only as one of the dimensions of the economic well-being or a major determinant of the longer-term prospects of households and individuals, but as a relevant component to better understand vulnerability and when policies are designed to contrast poverty.

This view implies looking at how to combine poverty indicators with those about financial wealth (easily to be liquidated unlike that based on real asset) to better identify the more vulnerable segments of population or those that are vulnerable

despite their income level. Households that are poor on income basis and that do not have financial wealth resources to face their conditions are in a sever poverty and are more vulnerable than those poor as well but with financial wealth available. Households that are not poor but whose income puts them slightly over the poverty line but without financial wealth are vulnerable because they do not have available any safety net to face, at least in the short run, unexpected shocks. Being poor on wealth and income basis is different from being poor only on income basis as well as being not poor on income basis but poor on wealth basis is different from not being poor on both the dimensions. Analysing this combination of factors specifically for the poor households represents a crucial point to define adequate policies to contrast poverty and to prevent worsening of living conditions due to shocks.

To this aim it is very important the availability of households' data that combines these three different dimensions of the well-being, generating at the same time a more comprehensive picture of poverty (also by other dimensions as the access to education, to health and other welfare services). Unfortunately, this is an objective that is difficult to pursue. In the high-income countries surveys on households' consumption are in most of the cases separated by those on income, and those on income collect only partly information on wealth. In low-and middle-income countries households' survey are very often designed to collect data on a so wide set of variables (income, consumption, expenditure, living conditions, households' productive activities) that questions related to wealth are a few and often do not allow to obtain enough or reliable data. The consequence of this lack of integrated data set, is a frequent omission of the wealth dimension in the estimation of poverty, that, in addition also reflects a partial lack of analytical tools accounting for the role of assets in the poverty definition (Brandolini *et al.*, 2010).

One exception is represented by the Household Finance and Consumption Survey (HFCS) that is a joint project among all the national central banks of the Eurosystem, the central banks of two European Union (EU) countries that have not yet adopted the euro and various national statistical institutes. Within this frame, the Survey on Household Income and Wealth (SHIW), that the Bank of Italy has been conducting since the early 1960s, allows for the analysis of poverty conditions by considering not only annual income flows, but also the wealth held by households. To grasp the importance of assets, a household can be defined as "financially poor" if, even by selling all immediately available financial assets, it does not have sufficient resources to maintain itself at the poverty threshold level for at least three months, i.e. it has financial wealth liquid (equivalent) lower than 15% (=25%×60%) of the median annual equivalent income.

The importance of an integrated analysis of households' economic well-being has been recognized in several contexts (Balestra and Oehler, 2023): the report of the

Commission on the Measurement of Economic Performance and Social Progress (Stiglitz *et al*., 2009) and the Vienna Memorandum published by the Conference of the Directors General of the National Statistical Institutes in 2016. Furthermore, in 2017 Eurostat and the OECD established a working group on the joint distribution of income, consumption, and wealth (ICW) at the micro level to have measures of the joint distribution of economic well-being across household groups.

Istat has been working on the experimental micro data production project on the joint ICW distributions for some years and recently also with the Bank of Italy, applying statistical matching methods to EU-SILC, HBS and to SHIW of the Bank of Italy. After the consolidation of the consumption imputation methodology (Donatiello *et al*., 2022), Istat and the Bank of Italy produced the first experimental ICW distributions for the year 2016 and are preparing to produce the experimental micro data for 2020. The objective is to provide a synthetic data set that allows analyzing the propensity to consume, to save, and asset-based poverty and wealth inequality. The publication of experimental indicators on household joint distribution of income, consumption and wealth and the availability of microdata for Eurostat (Eurostat *et al.*, 2023) will make it possible to fill an important information gap for the analysis of the determinants of poverty and inequalities.

2.4 More vulnerable and hard to reach populations

Most of the poverty measures are based on surveys which samples are selected from registers which scope is the entire population residing in private households. This means, in most of the cases, excluding some of the more vulnerable or disadvantaged groups that are particularly hard to be detected, because they are hard to sample (homeless, undocumented migrants, members of ethnic minorities or older people living in institutions) or are hard to identify (gender minorities for instance).

Hard-to-reach populations are groups, whose members may be reluctant to self-identify and for whom no sampling frame is available or who are a few or geographically concentrated so that proportional sample allocation fails. They frequently constitute a small proportion of the general population and are socially "invisible" due to their marginalized status, stigma associated with their identities or behaviours, desire for anonymity and fear of legal repercussions (Feldman, 2004; Raifman *et al*., 2022). Examples include people who suffer from severe forms of poverty and social exclusion related to housing deprivation and homelessness.

Covering these population groups has increased its importance also in the policy makers demand and has become particularly relevant for those countries which are committed to deliver on "Leaving No One Behind" principle of Sustainable Development Goals and Agenda 2030. Dedicated surveys on sub-groups represent a

way to fulfil this growing need of having a comprehensive view of the actual living conditions of the entire population and they have achieved significant methodological advancement and experience useful for improving the measurement of poverty, also making use of specialised or simplified proxy measures.

Regarding homelessness, only few countries have developed methodologies to regularly produce statistics[2] because of the difficulties in collecting information on the population group affected by these issues (Grassi *et al*., 2010). Istat has released analytical data on homeless people who use the services addressed to them thanks to two sample surveys conducted in 2011 and 2014, in collaboration with the Italian Ministry of Employment and Social Policy, the Italian Federation of Associations for the Homeless (fio.PSD) and the Italian Caritas organization (Istat, 2012, 2014, 2015). On the basis of these previous sample surveys, starting from 2025, it is planned to support the permanent census periodically with: i) the mapping of services for the homeless (canteens, dormitories, etc.); ii) a survey on homeless people benefitting from a select sample of the services; iii) a Point in Time (PIT) survey of people on the street (street homeless) (Di Leo, 2021)

Amongst hard to reach populations there are Roma, Sinti and Caminanti (RSC) populations, about which little reliable statistical information is available, also due to the limits imposed by the legislation for the protection of personal data, and in particular of sensitive data, such as ethnicity.[3] To fill this information gap, Istat, in collaboration with the National Office Against Racial Discrimination in defense of differences (UNAR) and several associations, has launched a series of research projects and surveys, concerning housing transition projects to provide indicators that measure the inclusion gap between the RSC population living in settlements and those in stable housing (De Martino *et al.,* 2017; Istat-UNAR, 2021).

[2] The main experiences are currently conducted in the United States, Australia, Netherlands, France and Sweden.

[3] In pursuit of the objectives identified by the National strategy for Roma, Sinti and Caminanti inclusion (RSC), implementing the European communication (Communication 173 of April 4, 2011 an EU Framework for national Roma integration strategies until 2020, approved by the Board in its meeting of 23-24 June 2011), our country is called to improve the statistical knowledge of these populations and develop a system of indicators to monitor inclusion policies, with particular regard to sectors of health, housing, education and work. A new Strategy has been released in May 2023 (National Roma and Sinti equality, inclusion, and participation strategy (2021-2030)) to implement the Recommendation of the Council of the European Union of 12 March (2021/C 93/01) and the role of the data availability and of Istat have been relaunched.

2.5 Subjective poverty

In addition to the relative and absolute poverty lines, it should be mentioned the subjective poverty lines which can be established starting from the perception that individuals have of their own condition with respect to the level of income and the availability of goods and services, usually in comparison with other groups of individuals or based on other specific criteria. In Europe, the aim of the subjective poverty indicator is to assess the respondents' perception of the difficulties experienced by the household in making ends meet (source: EU-SILC). The assessment considers the households' material wellbeing situation including income, expenditure, debt and wealth.

The differences between the lines of subjective poverty and those of objective poverty can be traced back to the expectations and distance of one's condition from that of the reference groups. In some cases, however, this difference may be the result of the ability to adapt to the deprivations. It can derive from psychological, relational, and cultural resources that discourage/prevent poor people from aspiring to improve one's condition, effectively making one's status even more miserable (Saraceno, 2023; Lucchini, 2023).

3. Overview of the Italian measures of poverty in the European context

In Italy the attention on poverty measurement experienced mixed fortunes after the second world war and a long period in which the problem was neglected also for its not appreciated political implications in the fascism era.

In 1951 it was established a "Parliamentary commission of inquiry into poverty in Italy and the means to combat it". It worked until 1954 and oversaw the conduction of different activities thereof a survey carried out by the Italian Central Institute of Statistics (Istat). The surveys managed by Istat were a general survey on the living conditions of the population, carried out at the same time as the labour force and a survey of the budgets of poor families. The results classified Italian households by considering three main dimension of consumption indicators: food consumption, clothing and footwear, housing. From the combination of the indicators referred to these three areas, it was estimated that 1,357,000 households (11.8%) were in extreme poverty, and 1,345,000 lived in condition of serious deprivation. It meant that almost one quarter of Italian population was poor at that time.

In the following 30 years, except for some episodes, no figures about poverty in Italy were produced (also by Istat) and the experience of the Parliamentary commission in the 50s remained isolated (Brandolini, 2021). After more than 30 years, in 1984, a new Commission of inquiry was established and by different names

and under renewed legal framework, it went on working and presenting an annual report to the Parliament until 2012 when it was dissolved. Under the umbrella of this Commission, since 1994 data on poverty were regularly disseminated and since 1998 (1997 data) it was Istat to elaborate and disseminate indicators about both relative and absolute poverty based on households' consumption data derived from Household Budget Survey.

In 2003 Istat interrupted the dissemination of the absolute poverty figures for some limitations of the methodology used to date, and established a Scientific Commission chaired by Livi Bacci and then by Andrea Brandolini that operated until 2007, when the estimations based on the updated methodology were released starting from 2005. In 2022 a new Scientific Commission (Inter Institution Scientific Commission on Absolute Poverty, IISCAP) was established (chaired by Istat President, Giancarlo Blangiardo) having the task to revise and update the methodology released by the previous one and has concluded its activity with a workshop held on the 7th of November 2023, releasing the results of its work that are the main subject of this edition of the RIEDS. To the innovations introduced by this Commission paragraph 4 will be dedicated.

In parallel with the national research and studies, during the 90s' of the last century, in the UE took place the project of a harmonized measure enabling the comparison across the member states. The European Community Household Panel (ECHP), replaced in 2004 by European Statistics on Income and Living Conditions (EU-SILC) were launched to fill the gap of statistics on income and provide reliable information on this variable to be used as the basis of poverty estimation. The European Council in 2001 approved a list of 18 indicators (the Leaken indicators) with ECHP before EU-SILC later provided the data to produce these indicators that combined monetary and nonmonetary dimensions of the poverty and deprivation.

This framework (national indicators of relative and absolute poverty based on households' expenditure data deriving from HBS, European harmonized indicators about relative poverty and households' deprivation based on information deriving from EU-SILC) is still ongoing for the Italian measures of poverty regularly produced by Istat. As aforementioned it has been complemented by the design and partial implementation of special surveys on hard-to-reach populations.

The fight against poverty and social exclusion remains at the top of the EU's social and political agenda. The joint pilot initiative between DG Employment, Social Affairs and Inclusion and the Joint Research Centre, called "Measuring and monitoring absolute poverty (ABSPO)", was launched in December 2018 to explore the technical, methodological, and data requirements of developing a cross-country comparable absolute poverty measure for EU-wide use (Menyhért *et al.*, 2021). The ABSPO project represents a novel approach and pilot initiative offering innovative modelling strategies using reference budgets and survey-based statistical methods to

measure poverty in EU countries. These yield new insights about the extent, distribution, and persistence of poverty in the EU that may complement and contextualise existing EU social indicators.

3.1 Measures of relative poverty

Indeed, Istat produces two measures of relative poverty: one based on consumption expenditure data (from HBS) and the other on income information (from EU-SILC).

The relative expenditure-based poverty measure is built on the International Standard Poverty Line (Ispl) which is the limit of demarcation between the poor and non-poor. The poverty threshold is defined for a two-members' household that is considered poor when its level of expenditure is lower than that reached, on average, by a single person. For households of different sizes an equivalence scale known as Carbonaro equivalence scale (1985)[4] is used (Istat, 2023). The values of the equivalence scale[5] represent the coefficients by which the expenditure of a household of a certain size is divided to make equivalent to that of a household of two components (with coefficient equal to 1). According to the methodology, the effect of economies of scale is introduced only after the determination of the poverty line which, in fact, is calculated on the not equivalent distribution of consumption expenditure. In other words, the threshold value (the consumption expenditure per capita) is the value of the consumption of a single person, obtained without considering the characteristics and size of the household they belong to.

Since 2004, Istat also provides statistics on relative poverty that are income based and harmonized at European level; the data source is the Income and living conditions survey (EU-SILC - Regulation EC n.1177/2003). The methodology of Eurostat sets the at-risk-of-poverty (AROP) threshold at 60% of median equivalent income. The longitudinal nature of the survey[6] also permits to estimate the persistent at-risk-of-poverty rate, i.e., the percentage of the population living in households where the equivalised disposable income was below the at-risk-of-poverty threshold for the current year and at least two out of the preceding three years.

[4] It is based on a simple double logarithmic function between consumption expenditures and size of the household (De Santis, 1996). The scale was estimated on the household budget survey data 1981-1983.
[5] 0.60 for a single member; 1.0 for two household members; 1.33 for three household members; 1.63 for four household members; 1.90 for five household members; 2.16 for six household members; 2.40 for seven household members or more.
[6] EU-SILC provides also longitudinal data on individual-level changes over time, observed periodically over a 4-year period (since 2022, in Italy, over a 6-year period).

The modified OECD scale is used to calculate the equivalent income. This equivalence scale gives a weight of 1.0 to the first adult in the household, 0.5 to any other household member aged 14 and over and 0.3 to each child below 14.

The variation in the value of the poverty line, from year to year, depends on changes in the distribution of consumption expenditure or of income and can lead to increases in the incidence of poverty even in periods of economic growth or vice versa. If this growth, for instance, determines a generalized increase in consumption, but more accentuated among families with the highest spending levels, the result is greater inequality which determines an increase in the value of the poverty threshold (even in a situation of invariance of the prices) and an increase in the number of relatively poor families. As a matter of fact, the families with the lowest consumption have worsened their conditions compared to the others, despite they have improved their standard of living. Conversely, in periods of economic recession/stagnation there could be a stability or decrease in the incidence of relative poverty if non-poor families reduced their consumption and therefore there is a consequent relative decrease in inequality in consumption spending (Freguja and Pannuzi, 2007).

3.2 Absolute poverty and non-monetary components

Istat is the only national statistical institute among EU Member States that conducts absolute poverty measurement in official capacity and, starting from 2017, this indicator, together with 11 other indicators of the framework for the measurement of Equitable and Sustainable Well-being (Bes), has entered to be part of the economic planning cycle, as required by Law n. 163 of 4 August 2016.

The details of the methodology to estimate absolute poverty will be discussed in the paragraph 4 focussing on the innovations introduced in the last update of the methodology. In general, in the Italian measures of poverty the thresholds to distinguish between poor and non-poor corresponds to the minimum expenditure required to purchase in monetary transaction the basket of goods and services that are considered essential to attain the "minimum acceptable" standard of living (Grassi and Pannuzi, 2009). Therefore, on the one side the choice of goods and services included in the basket refers to a concept of poverty broader than that of subsistence, and, on the other side, it ignores nonmonetary components (as in-kind transfers or the availability and the use of public services) that can influence people's quality of life (Saraceno, 2023a) but that are also very difficult to evaluate. If the value of some goods own produced or received as income in kind are considered respectively in HBS and EU-SILC and can be included in households' total expenditure or income, the evaluation of public in-kind transfers is controversial and poses conceptual and methodological problem of how to consider their actual

availability, accessibility, and quality for households belonging to different social classes and in different contexts.

3.3 EU-SILC indicators of material deprivation and social exclusion

Concerning nonmonetary components, "absolute" material deprivation measures are available every year thanks to EU-SILC. The severe material and social deprivation rate (SMSD) is an indicator that means the inability to afford some items considered by most people to be desirable or even necessary to get an adequate living standard. The indicator distinguishes between individuals who cannot afford a certain good or service, and those who do not have this good or service for another reason, because, for instance, they do not want or do not need it. The indicator measures the percentage of the population experiencing an enforced lack of at least 7 out of 13 deprivation items (6 related to the individual and 7 related to the household). The list of these items goes from the capacity to face unexpected expenses to replacing worn-out furniture for the household level and, for the individuals, from having internet connection to getting together with friends/family for a drink/meal at least once a month.

SMSD is then combined with other two indicators compiled based on EU-SILC data and that are the AROP (already shortly discussed in the previous paragraph) and the persons (aged less than 65 years) living in a household with very low work intensity (that is those living in households where adults worked for 20 % or less of their combined work-time potential during the previous 12 months; Eurostat, 2023). Combining the three indicators, at risk of poverty or social exclusion (AROPE) is obtained, as multidimensional indicator that corresponds to the sum of persons who are either at risk of poverty, or severely materially and socially deprived or living in a household with a very low work intensity. People are included only once even if they are in more than one of the situations mentioned above. The AROPE rate is the main indicator to monitor the EU 2030 target on poverty and social exclusion and was the headline indicator to monitor the EU 2020 Strategy poverty target.

4. The Italian methodology to estimate absolute poverty and the recent innovations

Absolute poverty is a condition in which households' consumption (or income) are below a certain threshold, based on the definition of a basket of basic needs. This latter refers to the identification of goods and services that, in a specific context, preserve individuals and households from deep social exclusion, and to their monetary evaluation. Since 2005, Istat calculates absolute poverty thresholds as the monetary value, at current prices, of a fixed basket of goods and services considered as essential for each household (according to the number and age of its members, geographical area of residence and municipality demographic size) to attain the minimum acceptable standard of living to avoid social exclusion.

In the approach adopted by Istat, the basic needs basket consists of three macro components: food (that means adequate nutrition), housing (dwelling of adequate size according to household dimension and equipped with heating and main services, durable goods, and accessories), residual (minimum necessary to dress, communicate, be informed, move, be educated and be in good health). On the one side, it is assumed that they are homogeneous all over the country (even if there are some differences due to 'external' reasons, such as the climatic conditions in the heating requirement), so that goods and services to satisfy them are the same everywhere in the Italian territory. On the other side, it is also assumed that the costs to meet basic needs may differ across the geographical areas of the country, since they reflect local differences of prices of goods and services in the basic need basket. The sum of the monetary values of the three different components returns the monetary value of the basket, corresponding to the absolute poverty threshold that varies according to number and age of household members, geographical area of residence and municipality demographic size. Therefore, there is not a single threshold, but as many absolute poverty thresholds as there are combinations of family types (by number and age of members), geographical distribution and type of municipality of residence (distinguishing between municipalities in the center of the metropolitan area, metropolitan area suburb municipalities, and municipalities with 50,001 inhabitants and above and other municipalities up to 50,000 inhabitants). They are revaluated every year by specific consumer price indices that, according to what was decided by the 2022-23 Inter Institution Scientific Commission on Absolute Poverty established by Istat, will be used between pictures of the monetary values of the thresholds carried out every three years avoiding that they are updated by inflation dynamics for a too much long time as it happened from 2005 to 2021.

Regarding the compilation of all these thresholds, the granularity of the new data sources available to this aim, has allowed to estimate them at regional level, whereas in the past they were calculated at level of geographical area.

To evaluate if a household is poor in absolute terms or not, data are used from the Household Budget Survey (HBS), carried out by Istat every year, whose main target is the estimation of all the expenditures incurred by resident households to purchase goods and services exclusively devoted to household consumption. As the largest part of consumption expenditure (namely, food and housing) is done at household level, household is the survey unit and household questionnaires are used. For this reason, for the estimation of absolute poverty the reference unit of the basket is the household; from this it also derives the need to define at the household level all individual needs (aggregated according to demographic characteristics of individuals and considering both potential economies of scale and saving forms that can be realized in different household typologies).

The methodology for the estimation of absolute poverty defines as absolute poor a household with a consumption expenditure lower or equal to the threshold. It is like saying that a household that cannot afford to purchase goods and services essential to meet basic needs cannot even attain an acceptable, although modest, standard of living in the social context in which they live, and this could imply severe forms of social exclusion. If all household members have the same chance of accessing household economic resources, if a household is defined as absolute poor, also all its members are absolute poor.

Two indicators are currently disseminated which summarize information on poverty. The first is the proportion of the poor (incidence), that is the ratio between the number of households (individuals) in a condition of poverty and the number of resident households (individuals). The second is the average poverty gap (intensity), which measures "how poor the poor are", that means by how much, in percentage terms, the average monthly expenditure of poor households is below the poverty line.

As aforementioned, in January 2022 a new Scientific Commission on Absolute Poverty (IISCAP), chaired by Istat President, Giancarlo Blangiardo, was appointed to revise and update the methodological approach adopted in 2007 and realising figure from 2005. The conclusions of the IISCAP substantially confirmed the fundamentals of that methodology, introducing some important innovations, mainly in the estimation of thresholds given the extraordinary richer availability of new data sources usable to this aim. The reasons of this choice in continuity assumed by the new Commission are related on the one side to the effectiveness of the 2007 methodology to detect the evolution of poverty since 2005 and on the other side to the results of several simulations that proved the stability of the results although the different data sources used to estimate the thresholds. The other important news introduced were related to the new population frame that was used to calibrate the data collected in the HBS and the new classification of consumption (COICOP 2018) adopted for 2022 HBS round. These two important changes have affected only partly the evaluation of the thresholds (mainly for the residual component that is still

endogenously estimated) whereas they have affected the estimation of the expenditure of each household that is used to consider them poor or not poor. The other important change that could have had consequences on the position of each household with respect to the reference threshold is the saving/not saving coefficient used to consider the economy of scale in the purchase that can be achieved by large size households.

4.1 The Food component

The food component is based on the nutritional needs of the individual, that vary by age classes, identified with those officially summarized in the Recommended Nutrient Intake Levels (RNILs) established by the Italian Society of Human Nutrition (SINU). The last release of RNILs (2014) was used for the last revision of the Istat methodology for absolute poverty. Therefore, food and drink needs were defined considering the individual calories needed to carry out the usual daily activity and are supposed to be invariable over time and independent from individual preferences. Then, these nutritional needs were converted into individual food combinations, by age group, expressed in average daily grams for each type of food. The selection of food and beverages was carried out considering the results from the new survey conducted by Council for Agricultural Research and Economics Research Centre for Food and Nutrition (Crea). The final number of items selected for the 2022 estimation of absolute poverty was equal to 101.

To achieve the monetary evaluation of this basket of food items, a correspondence table was set up to connect the 101 items to one or more products in the consumer price basket. In this work a very important innovation about the data sources used was introduced given that 33 out 101 food items were mapped to the products for which prices are collected in the traditional territorial data collection, whereas the remaining 68 were mapped to products for which the data source for consumer price indices (CPIs) estimation is represented by scanner data, an alternative data source that was introduced in 2018 in the estimation of the Italian CPIs and that brings a very wide coverage of the territory and of the product details.

The evaluation of the monetary value (cost) of each basket component has been obtained considering for each good, the minimum price accessible to all households, not simply the absolute minimum price. In this step of the compilation of the threshold for the food component, another important innovation was introduced in the last exercise of revision of the methodology. As a matter of fact, taking advantage of the granularity of information available for scanner data and the possibility to better represent the consumption behavior of the poor people, for the 68 products for which this new data source was used, the minimum price was estimated at regional

level considering the lowest quintile of distribution of Global Trade Item Number GTINs' prices for each market (identified selecting the most representative in terms of turnover) by retail trade distributional channel. For the items evaluated by using the prices derived from the traditional data collection, the algorithm was the same as in the past (average regional of minimum provincial prices detected by retail trade distributional channel), except for the reference territorial level (region instead of geographical area).

Adding up the individual components yields the monetary value of the household's food additive basket.

From the additive food basket, the final thresholds of the food component were recalculated by applying the multiplicative coefficients that summarize the effect of saving/non-saving forms of purchasing (household per capita food expenditure decreases as household size increases). Multiplicative coefficients were re-estimated in 2022 by studying the additive food basket per capita and the average food expenditure per capita of households confirming the methodology adopted since 2005.

4.2 The Housing Component

The housing component includes several needs that are considered fundamental to attain minimum acceptable standard of living to avoid social exclusion. They are made of the availability of a dwelling adequate to the size of the household, heated and provided by electricity, and equipped with some basic durable goods as refrigerator, cooker, washing machine and TV. Concerning dwelling, the minimum requirement is defined as a rented dwelling (the minimum dwelling size is given by Ministerial Decree 5/7/1975, that establishes the criteria for habitability, duly modified to consider the lack of small surface dwelling in Italy) at market prices, given the hypothesis that a family with severe budget constraints does not own a home because it is unlikely to be able to access the financing needed to purchase it, given the lack of the minimum assets needed to take out a mortgage, and that the supply of subsidized rental housing is insufficient to meet the needs of low-income households.

Therefore, estimating the monetary value of the expenditure necessary to guarantee these basic needs means estimating the value of the rental to be paid for an adequate dwelling, the amount to be paid to have the electricity necessary to enlighten the dwelling and to feed the appliances and that necessary to heat it, together with the cost of the annual consumption flow provided by the ownership of some essential durables. Indeed, the housing component of the threshold of absolute poverty can be broken down by four subcomponents: rentals (the prevailing one),

heating, electricity, and durable goods. Except for durable goods, the revised methodology released by the new Scientific Commission in 2023 has introduced important innovations in the estimation of the monetary value of each subcomponent.

Concerning the subcomponent of rentals, the most important innovation is about the data source used to estimate the monetary expenditure necessary to rent a dwelling in a region (not on a geographical area as it was in the previous methodology) for a household of a certain size. Differently from the past when this estimation was endogenous and based on the HBS data, in the revised approach it is the data base of rentals of dwelling made available to Istat by Tax Office (almost a census) the source of this estimation. In addition, if previously the price per square meter was obtained through a model applied to HBS, since 2022 estimation of absolute poverty indicators, this price is obtained by stratifying the information, duly treated for the outliers detected, in the Tax Office data base. This change has meant calculating the value of this subcomponent by an exogenous source, increasing to about 70% on average the share of the total threshold of absolute poverty exogenously compiled.

Quite the opposite, concerning electricity, the change has moved from an exogenous approach (based on the 1993 analysis carried out by ENEL, the national statistical agency for electricity), to an endogenous one to estimate the monetary value of the basic need of providing the dwelling by electricity enough to enlighten it and feed the appliances. It means using a model where the data are those obtained from HBS, and the model is a pooled model that uses data of 2014-2019 with 2019 prices. This model allows obtaining the threshold for electricity, domestic hot water, and cooking gas (in the methodology released in 2023, the latter ones have been separated from the estimation of the heating subcomponent differently from the previous approach).

As regards the heating subcomponent the innovation introduced has moved again from the use of HBS data (endogenous source) to an exogenous one, by using the methodology defined by Faiella *et al.* (2017), and the estimates made by Faiella and Lavecchia for the years 2014-2019. They have specified the minimum expenditure necessary to meet the European standard EN 15251 (which establishes 17.5 degrees as the temperature threshold for minimum acceptable comfort). The estimates of the minimum expenditure necessary to have this minimum temperature are based on the unit demand for heating (expressed in terms of physical energy expressed as Kwh per square meter) for 140 typical buildings, classified according to the climate zone, the period of construction and the type of dwelling. The same regression model used in 2003-2005 has been used (with a few changes), but as dependent variable, the threshold of energy poverty as calculated with the method proposed by Faiella et al. (2017).

Finally, for what concerns the durables by which the dwelling must be equipped, the same method as in 2005 has been used in the 2022-23 revision. Therefore, the minimum cost of durable goods considered essential has been obtained from consumer price survey, spreading the cost according to the same average duration in years that was used in 2005 (Tv set 10 years, washing machine 15, refrigerator 10, oven instead of non-electric kitchen 15 years) to consider the value of the consumption flow provided by each durable considered as essential.

4.3 The Residual Component

In the Istat methodology to estimate absolute poverty, the assumption is that households must also be able to acquire the minimum necessary to clothe, communicate, be informed, move, educate, and keep healthy. This is the third main component of the basket of basic needs deemed necessary to attain a living standard that avoids serious risk of social exclusion, in the conceptual frame that has overcome the concept of absolute poverty as mere survival. The estimation of the monetary value of the residual component completes the estimation of the monetary value of the thresholds used to evaluate if a household (and their individuals) is poor or not.

In the revision of the Istat methodology implemented by IISCAP in 2022-23, the approach established in 2005 was substantially confirmed. First, it was detailed the basket of products belonging to clothing, footwear, communication, information, education, and health areas that are deemed necessary to guarantee fulfilling the basic needs related to these areas. Second, it was confirmed that would have been arbitrary establishing the quantities of each product necessary to this aim. Therefore, given that the residual component expenditure depends strongly on the individual characteristics of the family members, both in level and composition, and is less sensitive to the effect of economies of scale than the expenses for housing, heating, household utilities or for durable goods, it was hypothesized, as in the former approach, that the residual component is affected by the family composition in a similar way to the food component. Consequently, the coefficients of a linear regression that associates, at family level (considering the different household composition by age group of members), food expenditure and residual expenditure, as detected in Italian HBS, were estimated, and used to calculate the monetary value also of this component.

The main innovation introduced in 2022-23 were about the basket of products and the model underlying the linear regression.

Concerning the basket of products, a deepen analysis was conducted on HBS data to understand if, compared to the past, some items have significantly increased their

relevance in the households' expenditure to be considered as part of those necessary to satisfy basic needs. At the end, it was agreed on the one side to introduce in the basket of products textbooks for secondary school (lower and upper) and taxes and fees for public secondary school, on the other side to drop the games for chance (were deemed not still sustainable the reasons for their inclusion), and some obsolete components such as landline phone equipment or traditional mail delivery service.

As regards the model and the linear regression, the intercept was introduced to facilitate the role of R^2 to explain the share of variance explained by the model and better interpret the meaning of the coefficient of the different variables considered in the model. The second innovation introduced in the model is about the food expenditure (the covariate). In 2005 to the food basket value used to estimate the monetary value of the residual threshold, were applied the coefficients summarizing the effect of the forms of saving/not saving estimated to consider for the food component the different size of the households. Given that only some of the goods in the basket of the residual components are prone to forms of savings (due to discounts, promotional offers for the quantity purchased, or to savings packages or large formats), it has been agreed to apply only partly the coefficients of saving/non-saving to the food component in the model to estimate the residual one. Specifically, these coefficients were applied only to 18.6% of the food basket considering the share of expenditure of the residual basket component that were deemed prone to saving/non-saving attitudes.

4.4 A summary of the innovations introduced in 2022-23 to estimate absolute poverty and their impact

In table 1 a summary is traced of the main innovations introduced in 2022-23 in Istat methodology to estimate absolute poverty and that were described in the previous paragraphs.

As it was clarified in the introduction to this paragraph, all these innovations have been introduced in a methodological framework that was established by the Scientific Commission that worked in 2003-2007 and confirmed by that one that worked in 2022-2023.

Table 1 – *Summary of innovations introduced in 2022-23 in the Istat methodology to estimate absolute poverty*.

	New data sources	Methodological and other innovations
Food component	Scanner data	Use of the last release of Recommended Nutrient Intake Levels (RNILs) established by the Italian Society of Human Nutrition (SINU) in 2014. The selection of food and beverages to convert the nutritional needs carried out considering the results from the new survey (2017-22) conducted by Council for Agricultural Research and Economics Research Centre for Food and Nutrition (Crea). For scanner data, minimum price estimated at regional level considering the lowest quintile of distribution of GTINs' prices for each market (identified selecting the most representative in terms of turnover) by retail trade distributional channel.
Dwelling component		
Rentals	Frome HBS to Tax Office data	From a model based on HBS data to stratification of Tax Office data.
Electricity	From external to HBS data	Pooled model that uses HBS data of 2014-2019 with 2019 prices.
Heating	From HBS to external data sources	Change in the dependent variable of the model by using the threshold of energy poverty as calculated with the method by Faiella et al. (2017).
Durables	-	-
Residual component		Revision of the basket. Intercept in the model that established the relationship between food expenditure and the residual component. Specific consideration of saving/non-saving coefficients.
Households' expenditure to assess their position (poor/non-poor)		Introduction of COICOP 2018 in HBS data. New population frame from population Census 2021.

The year 2021 was the year when a parallel HBS was conducted by using the in one case the COICOP 1999 and, in the other case, the COICOP 2018.

2021 Absolute poverty indicators were released by Istat based on the previous methodological design and the previous population frame. For sake of impact evaluation, absolute poverty rates were also compiled considering all the innovations introduced and summarized in table one. By grouping these innovations in three main components (population frame, new classification, methodological innovations), the impact of each of them and of all of them considered all together was estimated. In table 2 the results are reported.

Table 2 – *Impact of innovations introduced in the methodological design to estimate absolute poverty in Italy. Absolute poverty rates. Year 2021.*

	2021 Official absolute poverty rates released by Istat	**Innovation introduced in 2022-23**						
		Population frame	COICOP 2018	Meth. innovations	Population frame and COICOP 2018	Population frame and meth. innovations	COICOP 2018 and meth. innovations	All
Household	7.5	7.4	7.7	8.2	7.5	8.1	8.2	8.1
Individual	9.4	9.2	9.6	9.6	9.4	9.4	9.7	9.5

The comparison between the 2021 absolute poverty rates released by Istat and that compiled based on the innovations introduced highlights the robustness of the backbone of the methodology adopted in 2005 and confirmed in 2022. The impact of the innovations introduced is low and mainly referred to the indicator by household, whereas by individual it is substantially marginal.

5. Income-Based Approach for Measuring absolute poverty

Since the definition of the absolute poverty lines is exogenous to the distribution of both income and consumption, the absolute poverty can be also analysed by focusing on households' income, shedding a different light on the characteristics of the phenomenon (Cutillo *et al.*, 2020). The poverty lines can be easily applied to IT-SILC data, according to the household's size and age composition, plus the geographical area of living and the size of the municipality. As an example, we can compare estimates of incidence and intensity of absolute poverty carried out by using the 2019 wave of the Italian HBS and SILC.

When focusing on households, the consumption-based absolute poverty incidence is 6.7% (about 1.71 million households), whereas 5.8% (about 1.5 million households) is the figure obtained when we follow an income-based approach. When focusing on individuals, larger differences emerge: the consumption-based value

(7.6%) is indeed much higher than the income-based value (5.5%). In absolute values, poor individuals according to the income distribution are about 3.25 million less than poor individuals observed according to their expenditures (4.48 million). Contributing to these results is the fact that consumption also reflects the expectations of future incomes and the saving and dissaving along the life course rather than the mere current income. The greatest differences emerge when the incidence of absolute poverty is assessed by household size. While for a single-member household income-poverty is higher than consumption-poverty (8.8% vs 6.6%), for large size households the situation overturns (9.6% vs 15.2%). Consistently, single persons aged below 65 years old are more frequently poor when considering income rather than consumption (11.7% vs. 6.8%, respectively), while in all household types with children the consumption-poverty is higher than the income-poverty.

Income-based poverty is higher than consumption-based poverty among the households headed by individuals aged less than 35 (10.7% vs. 9.7%), often suffering from income constraints due to unemployment and low-paid jobs, whereas consumption-based is higher than income-based poverty among the elderly (5.3% vs. 2.9%), that generally have a high saving propensity.

The incidence of absolute poverty is much higher within households with at least a foreign than within households with all members with the Italian citizenship (income-based 16.6% vs 4.7%), even if the gap between the two types of households enlarges when consumption-based poverty is used (23.9% vs 5.0%), maybe due to different consumption habits between immigrant and native households.

Finally, the absolute poverty intensity, measured through the poverty gap (the average percentage distance from the threshold for poor households) almost doubles when poverty is based on income than on consumption (38.2% vs. 19.9%) because, as well-known, the income distribution is much more unequal than the consumption distribution.

6. Concluding remarks

The topic of poverty measurement has increased its importance in the last decades and in the last years, considering obstacles that the fight against poverty and specifically absolute and extreme poverty are finding, although the progress and the results achieved. The recent Covid-19 and inflation crisis (the latter also pushed by the Ukrainian war and the international stability issues) have spotlighted again the attention on poverty and the objective of leave no one behind (LNOB) that is central in the 2030 Agenda for Sustainable Development and its Sustainable Development Goals (SDGs).

Italian context is the context of an economically advanced country where the phenomenon of absolute and extreme poverty has a different weight than in the low- and middle-income countries, but the indicators of the last decades highlight the persistence (and in the recent years the increase) of a share of population forced to live in condition of marginality.

The worth of the Italian measures of absolute poverty is that of focussing the attention on the conditions of a minority that is such only in terms of percentage but not in terms of number (more than 5.5 million individuals in the preliminary figures recently released about 2023) and that has the risk to be disregarded. As a matter of fact, the constant and stable release of absolute poverty indicators has played an important role in attracting the attention of the policy makers on this so important social dimension and pushing them to adopt measures to contrast absolute poverty (in the recent year measure as inclusion income, REI, citizenship income, RDC and the recent inclusion benefit, ADI).

These are reasons that stress the importance of the work done by the 2022-23 Scientific Commission to improve the quality of the indicators produced by Istat, assessing the robustness of the main methodological choices adopted so far.

But, as it is illustrated in this contribution, the measure of absolute poverty is still based on a monetary approach. It is crucial but seems to be not enough to represent a phenomenon that in a quickly changing society assumes new and in some case unknown characteristics. Poverty progressively is no longer only lack of money to purchase goods and services that allow satisfy basic needs, that is a fundamental aspect of social exclusion but that does not exhaust it.

Therefore, the challenge of complementing the measure of absolute poverty with other indicators that enable to detect the more complex dimensions of this phenomenon are in front of Istat and of the scientific community and can be better faced starting from the recent achievements.

This is why one of the legacies from the 2022-23 Scientific Commission was that of advising Istat to establish an Advisory Board that, in continuity with the work done, can deal, in the coming years, with this crucial challenge.

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THE NEW FOOD SUB-COMPONENT OF THE ABSOLUTE POVERTY BASKET: AN OPTIMAL BALANCE OF ELEMENTS

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Abstract. The Inter Institutional Scientific Commission on Absolute Poverty (IISCAP) was established at the National Institute of Statistics (Istat) at the beginning of 2022 with the aim of confirming the validity of methodology used since 2005 and improving the models for estimating poverty incidence. Several issues were addressed, including the calculation of the new version of the sub-component of the food basket, using new data sources and considering changes in the habits and lifestyles of households in Italy. This new data allowed for a more realistic picture of the great variety of foods consumed by people and has facilitated enhancing the basket. The main objective of this study is to illustrate the new approach in calculating the food component. National and international guidelines were used to assess the nutritional adequacy of the dietary plans for 12 age groups, based on the Dietary Reference Values for energy and nutrients (DRVs) for a healthy Italian population. Categorization of foods into groups and subgroups enabled the merger of individual portions and consumption frequencies with those recommended by healthy eating guidelines. Daily quantities for each type of food were calculated by considering portions (in grams) and consumption frequencies (daily or weekly); then, twelve nutritionally balanced and appropriately diversified food plans were developed in accordance with the age groups considered. The last phase of defining the food sub-component concerned its valorization through the identification of the average minimum price for each food and the application of the saving scales to consider the economies of scale depending on the household composition.

1. Introduction

Absolute poverty refers to some time-consistent standard that represents individuals' and households' basic minimum needs (Ravallion, 2016). In the European context the Directorate-General for DG Employment, Social Affairs and Inclusion and the Joint Research Centre, began a project in December 2018, called "Measuring and monitoring absolute poverty (ABSPO)" to explore the possibility of developing a national absolute poverty measure comparable at European level from the methodological, technical and data availability point of view (Menyhért *et al.*, 2021). Italy is the only country in Europe that produces official statistics on absolute poverty; it has been a focus since the second world war (De Santis, 1996; Commissione di indagine sulla povertà e sull'emarginazione, 1998; Freguja and

Pannuzi, 2007; Freguja and Polidoro, 2024). In 2005 Istat set up the new methodology to produce absolute poverty indicators (Grassi and Pannuzi, 2009); a measure based on the monetary evaluation of a basket of goods and services, considered essential to avoid serious forms of social exclusion, using the Household Budget Survey (HBS), defined with reference to household consumption comparing the expenditure of Italian households with the absolute poverty thresholds.

The Commission's new methodology has begun its work by confirming the validity and robustness of the previous methodology (Grassi and Pannuzi, 2009), but introducing some important innovations, mainly in the estimation of thresholds given the richer availability of new data sources that are used for this purpose (Arigoni, 2024; Brunetti *et al*., 2024; Cutillo, 2024; Di Leo and Corazziari, 2024). The initial approach was to create a basket of essential goods and services by using the existing regulations for each component (De Santis, 1996). For example, for the sufficient size of a dwelling in relation to the number of household components, reference has been made to the regulations of the criterion of habitability of dwellings (Cutillo, 2023); for food component, reference has been made looking at the DRVs for the Italian population (SINU, 2014). Naturally, a study was done to understand changes in demand and consumption over time due to globalization of food production.

For the construction of the new food basket, Istat collaborated with the Council for Agricultural Research and Economics-Research Centre for Food and Nutrition (CREA) to identify the types of food to build the appropriate food diets for each age class considered, according with the DRVs for the Italian population and Guidelines for a Healthy Diet (CREA, 2018b). The first part of this paper is focused on the methodology adopted in the construction of the food basket, with a multistep approach; then the second part shows a comparison between selected food baskets and the previous version; and the last part explains the identification of the average minimum price of food items of the food basket, followed by the main conclusions.

2. Methodology adopted in the construction of the food basket

The food basket subcomponent was developed taking into account changes since 2005 in food demand and consumption partly caused by the globalization of food supply and inflation dynamics. The availability and choice of foods that previously had a more marked seasonality, as well as the accessibility of food through multiple channels, and the entire distribution chain have changed.

Furthermore, the use of updated databases has allowed the constitution of the food basket based on the identification of a heterogeneous set of foods among those most commonly consumed by individuals living in Italy. The combination and

quantification of these foods ensure an adequate nutritional and energy intake to keep the population in good health. The updated scientific documents of the previous methodological commission constituted the reference material for this work, in order to minimize the subjectivity of the expert group composed of nutritionists, statisticians, economists, and sociologists.

The new food basket was created through a meticulous analysis by the expert group regarding the methodology adopted. Thus identified the tools and documents needed to define the fundamental steps for building the food basket.

The main steps are described in the following subsections.

2.1 Step 1: Identification of age classes

Dietary consumption and energy/nutritional needs vary according to the age; for this reason, the DRVs of SINU subdivide the total population in ten age classes (0-11 months, 1-3 years, 4-6 years, 7-10 years, 11-14 years, 15-17 years, 18-29 years, 30-59 years, 60-74 years, and 75+ years). In addition, further division of two classes occurred for infant, "0-1 years", that was split into two (0-4 months and 5-11 months) to assess the intake of breast milk/formula and specific weaning foods (UNICEF, 2024), and the "1-3 years" class into "12-23 months" (from 1 year until just before completion of 2 years) and "24-47 months" (from 2 years until just before completion of 4 years) due to significant differences in energy requirements (SINU, 2014). All the other classes considered were confirmed and updated in energy requirements.

2.2 Step 2: Selection of food items

The process of selecting foods to be included in the dietary plans, was carried out within the varied and extensive foods available to the Italian population. To facilitate the selection process, foods were chosen by categorizing them into the 26 food subgroups of the 12 food groups for which the Guidelines for a Healthy Diet provides reference portions (in grams) and respective consumption frequencies (daily or weekly) (CREA, 2018a; CREA, 2018b). The guidelines for food subgroups were adapted to meet nutritional requirements: a) the cheese subgroup was divided into 3 subgroups instead of two; and b) 9 subgroups of infant foods were added.

Additionally, to make the dietary plans more realistic, 7 food items belonging to the group of food "voluptuaries" (ice cream, pastries, chocolate, jam, honey, sugar and preserved meat) were also included. These "voluptuary foods" are those commonly consumed primarily for sensory pleasure or taste, rather than for specific

nutritional purposes; they have low healthiness, high energy density, and low nutritional value. It is recommended to consume them in moderation due to their high sugar and/or fat and/or salt content (CREA, 2018a). Their inclusion was carefully monitored for nutritional adequacy, but they were still inserted to make the diet closer to real food habits.

For the 0-4 months age class, breast milk and first formula milk (both powdered and liquid) were selected, considering three scenarios: a) exclusive breastfeeding, as recommended by the guidelines; b) artificial feeding with formula in both powdered and liquid forms; and c) mixed feeding for completeness. For the weaning period (5-11 months), growth milk (both liquid and powdered) was also considered in the three different feeding scenarios, along with specific weaning foods for these months.

The final 13 food groups and 43 subgroups are shown in detail in Table 1. Within each food subgroup, a meticulous selection of food and beverages (referred to as "food items") was made by choosing from those most commonly consumed by the Italian population within age classes, based on data from the latest national survey on food consumption conducted by CREA (IV SCAI study 2017-2020), covering a sample (n = 1,969) aged between 3 months and 74 years (Turrini *et al.*, 2021; Turrini *et al.*, 2022). The dataset of foods consumed by children aged 1-3 years included 1,982 food items, excluding fortified, processed, and special diet foods.

To create nutritionally adequate and as varied as possible dietary plans, as recommended by the Guidelines for a Healthy Diet (CREA, 2018b), it was deemed appropriate to select a high number of food items. For calculation purposes in creating the food baskets, some of these were averaged based on nutritional similarity; for example, "beef" includes various cuts of veal, young beef, and beef, while "apple" encompasses all species of this fruit. Accordingly, for children were considered 214 food items. The expert panel selected and reviewed those with the highest frequency of consumption; this was the main criteria used to evaluate which food items must be included in the basket. A similar procedure and analysis were conducted for the dataset of the 4-10 years and the 11-74 years age classes. For each age class were considered 216 food items.

Table 1 – *Selected food items by food groups and subgroups.*

GROUP	SUBGROUP	FOOD ITEMS
Milk and dairy products	Milk	Whole milk, Semi-skimmed milk, Skimmed milk
	Infant milk	Human milk, First infant formula powered(1), First infant Formula liquid(1), Follow-on formula powered(1), Follow-on Formula liquid(1)
	Yogurt	Yogurt(1)
	Fresh cheese	Mozzarella cheese(1), Ricotta cheese(1), Cheese spread(1)
	Infant cheese	Infant cheese(1)
	Semi-hard cheese	Fontina cheese, Scamorza cheese
	Hard cheese	Pecorino cheese, Grana cheese, Parmigano cheese
Cereals and derivatives	Bread	Loaf bread(1), Bread rolls(1), Sandwich bread(1), Whole bread
	Pasta	Pasta, Egg fresh pasta, Egg dried, Stuffed pasta(1)
	Infant pasta	Infant pasta(1)
	Other cereals	Spelt, Corn(1)
	Infant cereals	Infant cereals, powder(1)
	Rice	Rice(1)
	Biscuits	Shortbread biscuits(1), Dried biscuits(1)
	Infant biscuits	Infant biscuits(1)
	Savoury fine bakery products	Rusks(1), Craker(1)
	Breakfast cereals	Breakfast cereals (1)
Meat	Red meat	Veal meat(1), Pork meat(1)
	White meat	Turkey meat(1), Chicken meat(1)
	Infant meat	Infant meat(1)
Fish and fish products	Seafoods	Squid, Shrimp
	Fish, fresh	Cod fish(1), Gilt-head bream, Sole fish(1), Salmon(1), Swordfish
	Fish, preserved	Tuna fish canned
	Infant, fish	Infant fish(1)
Legumes	Pulses, dried	Dried lentil, Dried beans(1)
	Pulses, fresh	Peas(1)
	Infant, pulses	Infant legumes(1)
Egg	Egg	Eggs(1)
Tubers	Tubers	Potatoes(1)

Table 1 (cont.) – *Selected food items by food groups and subgroups.*

GROUP	SUBGROUP	FOOD ITEMS
Fruit	Fruits, fresh	Oranges, Tangerines(1), Apricots, Apples(1), Pears, Peach, Banana
	Infant, fruits	Infant fruits(1)
Nuts, olive and seeds	Nut	Dried fruit(1), Olives(1)
Vegetable	Vegetables, fresh	Cabbages(1), Green beans, Mushroms(1), Broccoli, Chard, Spinach, Eggplants, Tomatos(1), Pumpinks, Zucchini, Carots, Celery, Fennels
	Salad	Lattuce(1), Rocket, Radicchio(1)
	Infant, vegetables	Infant vegetables(1)
Oils and fats	Seasoning fats	Olives oil(1), Seeds oil, Butter(1)
Voluptuaries' food	Cakes and sweet snacks	Ice cream(1), Sweet croissant(1), Ring-shaped cake(1), Crostata(1), Spread chocolate, Chocolate (1), Jam(1), Honey, Sugar
	Meat, preserved	Cooked ham, Raw Ham(1), Sausages(1)
Water	Water	Tap water(1)

(1) Food items averaged based on nutritional similarity.

Consumption frequencies of foods were compared by geographical breakdowns (North-east, North-west, Centre, South, and Islands) to determine if geographical differences could influence food selection.

2.3 Step 3: Evaluation of Nutritional Adequacy by age classes

The nutritional adequacy of the dietary plans was assessed for each age class using:

a) the "nutritional composition" database from the IV SCAI study (Turrini *et al*., 2021; Turrini *et al*., 2022). This database is derived from analytical data on nutritional composition of the Italian Food Composition Tables (Carnovale and Marletta, 2000). Any missing nutritional data from analytical results were completed using other Italian and international composition tables as sources; and

b) the DRVs suggested by the FAO, the WHO (FAO/WHO/UNU, 2001; WHO, 2006), and the DRVs (SINU, 2014). These DRVs refer to healthy individuals participating in moderate physical activity. The average of the DRVs between males and females was calculated, the difference between genders was not statistically different in this case, as it was in the past.

Specifically, for each dietary plan, the requirements of energy, macro and some micro nutrients were considered: energy (kcal), total fats (% of energy), saturated fats (% of energy), and polyunsaturated fats (% of energy), proteins (% of energy), available carbohydrates (% of energy), sugars (% of energy), fibers (g), iron and calcium (mg), vitamin C, B6 (mg), B12 (μg), and water (g).

2.4 Step 4: Calculation of daily quantities per food item

Daily quantities for each food item were determined based on national and international scientific documents. Specifically, for the early age classes (0-4 months and 5-11 months), daily quantities were estimated based on the energy requirements calculated as the average of the needs for the first 4 months (FAO/WHO/UNU, 2001; WHO, 2006). In the dietary plans for age classes from 1 to 17 years, portions (in grams) and consumption frequencies (daily or weekly) suggested for pediatric age by the Guidelines for a Healthy Diet were considered (CREA 2018a; CREA 2018b; Rossi *et al*., 2022). For subsequent age classes (18 to under 75 years), standard portions and recommended consumption frequencies for adults were used based on the energy requirements of each age class (CREA, 2018a; CREA 2018b; SINU, 2014). Due to the limited variety of selected food items compared to a real diet, it was sometimes necessary to modify the portion size or recommended frequency to ensure the nutritional adequacy of the dietary plans for the specific age class.

In each dietary plan, the total daily quantity (grams) should be considered as the sum of the amounts of all food items. However, this cannot be directly applied for the 0-11 months age class as one of the three infant foods are in powder form. Therefore, the sum of quantities should be calculated taking into account the dilution of the powdered milk.

3. Selected food basket products and comparison with the previous version

The analysis comparing average food group quantities between the old and new basket shows differences for almost all food groups, except for cereals (excluding infants because they were not considered in the old basket). Most of the differences were justified by the adoption of the new Guidelines and reference levels (Figure 1). Regarding energy intake compared to the level recommended (Figure 2), the old basket exceeds the requirement for all age classes except for the first one (1-3 years).

Figure 1 – *Comparison between old and new food baskets of the amount (g/die) of the food groups.*

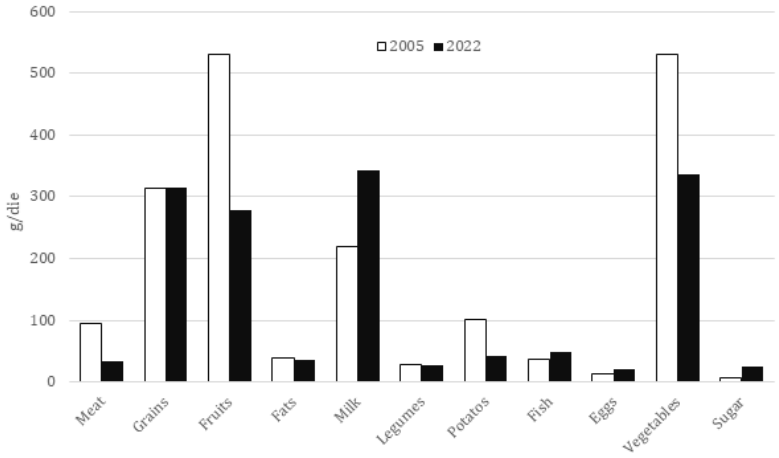
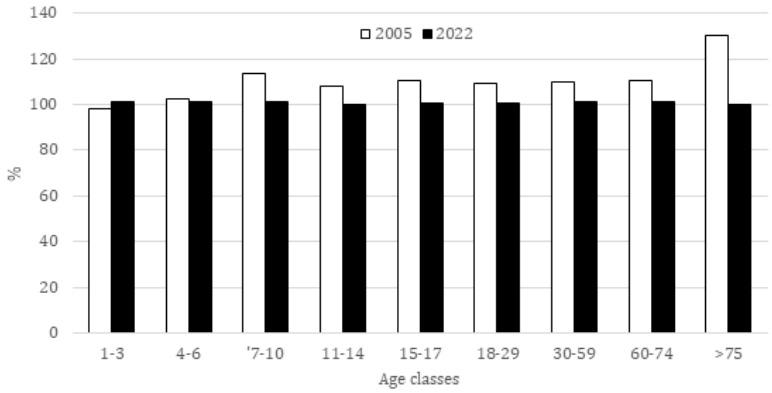


Figure 2 – *Comparison between old and new food baskets of the ratio of energy calculated to energy recommended by age classes.*



3.1 Main results of comparison in terms of daily amount

The increase in the number of food items compared to the old food basket (from 34 to 100 food products) is needed to ensure the variety of the diet, which is one of

the capstones of the new dietary guidelines, and to guarantee nutritional adequacy by both age classes and gender.

The food selection based on the frequency of consumption of the Italian population was adopted for creating more realistic dietary plans; therefore, 'Liver' and 'Margarina' were excluded from the new basket because the percentage of consumers (of 1.4% and 0.2, respectively) was very low. On the other hand, 'Mortadella' was not considered because the dietary guidelines discourage the consumption of processed meat, that in the new basket is well represented by the 'Ham' and 'Sausages'. In addition, the variety of food items allowed to develop a single dietary plan for genders while still ensuring the macronutrient adequacy for both males and females. At the food group level, the average amount of meat in the new food basket has decreased by 64%. It should be underlined that in recent years scientific literature and epidemiological studies have pointed out that excessive meat consumption, particularly red meat, is a risk factor for some non-communicable diseases and to ensure protein intake; so, the daily quantity of eggs and legumes has been increased, in accordance with the new dietary guidelines recommending the alternation of vegetable and animal proteins. The daily amount of fruits and vegetables was lowered in line with the portion sizes suggested by the new WHO guidelines.

Another difference between the two food baskets (2005 vs 2022) is the number of age classes, from ten to twelve. In the new one, age classes 0-4 and 5-11 months were included to account for weaning. The 1-4 years age class has been divided into two classes (1-2 years and 2-4 years) due to differences in energy requirements. Additionally, age classes 30-49 and 49-59 have been combined into a single one, 30-59 years, since there are no significant differences in energy requirements.

The comparison of the two food baskets is a critical point because the reference materials (SINU, 2014; CREA, 2018a; CREA, 2018b) were updated with the difference consequences in both in terms of the daily nutritional requirements (energy, micro and macro-nutrients), and in terms of suggested daily amounts (serving sizes and consumption frequencies).

The new methodology adopted has been described in such detail as it could serve as a guide for other and future food baskets.

4. Identification of the average minimum price of food items

The monetary evaluation of individual food combinations is based on Istat consumer price survey data, referred to year 2022. (Istat, 2023b; Brunetti *et al.*, 2024).

To estimate the minimum average price of each food identified in the basket, a mapping has been carried out that links each food item of the poverty basket to one or more elementary products of the consumer price index basket.

Tap water and human milk have been excluded from the mapping because they are not bought on the market. Additionally, for age class 0-4 and 5-11 months, concerning milk formula, both powder and liquid milk were considered. Therefore, the final number of food products to which a price was attributed was 96.

As the consumer price survey has been evolving in the last decades according to a multi-source approach, the methodology used for the valorisation of the food component of the poverty line has been adapted to take into account the characteristics of the information that is available for each of the elementary products involved. In particular, for 33 foods items (out of 96) of the poverty basket, the price quotations coming from the traditional price collection have been used. They are mainly fresh products such as fruits, vegetables, meat and some foods usually sold in packages of variable weight, such as dairy products.

For the remaining 63 food items, which generally consist of packaged processed food, transaction data coming from the sample of outlets (about 4,000) of the modern distribution have been used. The availability of this new data source, due to the size and granularity of the information that it provides, offered the opportunity to introduce a dramatic improvement in the procedure for the estimation of the minimum prices of this group of items (see Brunetti *et al*. 2024).

Independently from the source used, the price quotations are collected at the provincial level on a monthly basis[1]. In short, the procedure is the following: starting from the collected data, the provincial annual minimum prices of food items are first estimated as the arithmetic mean of the monthly provincial minimum prices. In the following step, the annual minimum prices of food items - for each region - are calculated as a weighted arithmetic average of the provincial annual minimum prices, with weights proportional to the population of the provinces.

The minimum prices so obtained provide the basis for the valorization of the food component of the poverty basket. However, to obtain the final value of the food sub-component it is necessary to apply the value of the savings scale, in order to take into account the number and the composition of the different types of households.

The saving scales represent some multiplicative coefficients that synthesize the effect of the forms of savings/not savings at the time of purchase. The coefficients of this saving scale have also been reformulated, through the processing of survey data, using the availability of a larger database. In 2022 the methodology followed

[1] It is important to note that the territorial coverage of the two data sources is different. The traditional price collection is carried out in the 79 provinces participating in the survey, while scanner data covers all the national territory (107 provinces). Moreover, as far as scanner data are concerned, monthly prices are obtained as the average weekly prices (see again Brunetti *et al*., 2004).

for the calculation of savings coefficients followed the lines of the previous version, but the phenomenon has been studied more thoroughly (Di Leo and Corazziari, 2024; Istat, 2023a).

Finally, the formula to obtain the value of the new food component (*fc*) for a family size *z* (with *z*1, ..., *z*7 components respectively in the 1st, ..., 7th age class) in the *k* region, is given by:

$$fc^{k}_{z1,\ldots,z7} = \sum_{j=1}^{7} q_j^k \, z_j \tag{1}$$

where q_j^k is the monetary value of the food combination for an individual resident in the *k* region and belonging to the *j*-th age class; then after applying the scale coefficient the estimated value of the food component (*fcest*) for a family size *z* (with *z*1, ..., *z*7 components respectively in the 1st,... 7th age class) in the *k* region, is obtained as:

$$fcest^{k}_{z1,\ldots,z7} = fc^{k}_{z1,\ldots,z7} \, c_z \tag{2}$$

where $fc^{k}_{z1,\ldots,z7}$ is the value of the food component obtained in (1) and c_z is the saving coefficient for a family size *z*.

The annual enhancement of the food sub-component is realized through specific regional price indices, calculated by homogeneous groups of food products. This allows the development of consumer prices to be taken into account in detail.

5. Main results of new poverty basket

The food component of the poverty basket is the result of specialized work by heterogeneous experts. The result is appreciable, although the greater detail of the thresholds (regional) and the increase in age classes of family members (from 6 age classes to 7) have multiplied the number of possible combinations within which it has been possible to calculate the sub-thresholds, the information available has been maximized.

The total number of food items identified for the creation of the food basket is 100 (Table 2), including the different types of infant formula, two (powered and liquid) for infants younger than 4 months (first infant formula) and for toddlers younger than 1 year (follow-on formula). The number of the food considered varies within the subgroups to ensure as much diet variety as possible and the nutritional needs of different age classes. The distribution by age groups shows how the number of food items increases with increasing age; specifically, from 3 food items for

infants 0-4 months, up to 79 for 11 to over 75 age classes (Table 2). Nutritional adequacy was achieved for all considered macro and micronutrients, except for calcium, which is lower than recommended in most age groups.

Table 2 – *Number of food items by age classes.*

	0-4 months	5-11 months	1-3 years	4-6 years	7-10 years	11- 75+ years	All
Food items	3	40	68	75	76	79	100

The study of the comparison between the old and new food basket revealed substantial differences between the food groups. According to the new guidelines, the contribution of animal proteins is reduced compared to the new basket but is compensated with legumes and dairy products; both fruit and vegetables have halved in the new basket, especially in children up to 15-17 years. For more adult classes, on the other hand, the amounts of dairy products, legumes, cereals and eggs are increased. This trade-off between foods, age class and nutritional adequacy, has increased the detail of the information available, and showed the great heterogeneity that is found within our country. The updated definition of food requirements and the achievement of age-balanced diets, combined with the values of the minimum average prices, provided a formidable starting point for further studies on the diversification between the different household types, showing the heterogeneity within the different regions of the country. The new food basket, in addition to achieving the nutritional adequacy by age, reflected more the real consumption habits of households because it was built on more detailed and updated information.

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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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THE NEW FEATURES OF THE RESIDUAL COMPONENT OF THE ABSOLUTE POVERTY BASKET

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Abstract. The Italian National Institute of Statistics calculates ever year the absolute poverty threshold as the monetary value, at current prices, of a fixed basket of goods and services considered essential to reach the minimum acceptable standard of living to avoid serious forms of social exclusion in the context in which one lives. The cost of the basket (and so the threshold) varies according to the household composition and territory of residence. To review and update the 2005 methodology for estimating absolute poverty[1], an Inter-Institutional Scientific Commission[2] was established in 2021, and introduced some changes[3] with regard to the estimation of the three main components of the reference basket (i.e. food, housing, residual) and its annual revaluation, as well as the use of new data sources[4]. This paper outlines the process of reviewing the residual component of the basket, explaining the changes introduced and their reasons. The analysis focuses on the composition of the basket of goods and services making up the residual expenditure, on the specifications of the linear regression model for estimating the coefficients to be applied to the monetary value of the food component to obtain that of the residual component, and finally on the food basket to be used for estimating the monetary value of the residual component.

1. Introduction

According to the approach adopted by the Italian National Institute of Statistics, the absolute poverty threshold, calculated ever year, is defined as the monetary value, at current prices, of a fixed basket of goods and services (related to food, housing and residual needs) considered essential to reach the minimum acceptable standard

[1] Taking into account the innovations introduced in the Italian Household Budget Survey from 2022 onwards (i.e., the most recent version of the COICOP Classification, that is COICOP 2018) and the new survey reference population based on the new series released by Istat's Permanent Census of Population and Housing (for further details: https://www.istat.it/en/statistical-themes/censuses/permanent-census-of-population-and-housing/results-of-the-permanent-population-census/).

[2] The Inter-Institutional Scientific Commission on Absolute Poverty (IISCAP) was chaired by the President of Istat, with the participation of experts from academia, the Bank of Italy, the Tax Agency, the Council for Agricultural Research and Economics, and other government agencies.

[3] The Commission has however validated the 2005 general methodological framework in terms of the main theoretical assumptions and basket components: see Freguja and Polidoro (2024).

[4] For details on the revision of the food and housing components and the annual revaluation of the basket, see the related papers within this same issue of the journal.

of living in order to avoid serious forms of social exclusion in the context in which one lives. The cost of the basket (and so the threshold) varies according to household composition (number and age of household members) and territory (region of residence and demographic size of the municipality). Households with a monthly consumption expenditure (based on data from the Italian Household Budget Survey) at or below their absolute poverty line are classified as absolutely poor.

The residual component of the absolute poverty reference basket aims to estimate the minimum necessary to furnish and maintain the dwelling, dress, communicate, be informed, move on the territory, get educated, and keep healthy. In 2005, individual goods and services to meet these essential needs were identified, without defining their specific quantities. This, in fact, would have been rather arbitrary, as it was impossible to refer to specific regulations (such as the one used for the adequate size of the dwelling), measures (such as the one used for energy consumption) or scientific reference standards (such as the Recommended Nutrient Intake Levels used for defining daily diets) to define how many residual goods and services one needs to avoid a condition of absolute poverty (Istat 2009, p. 22). And this is because such information was not, and still is not, available.

The 2005 residual basket was thus divided into the following macro categories: housing, clothing, communications, transport, health, education, and a miscellany one called 'other'. Compared to the basket of essential goods and services defined in 1997 by the first Commission of Inquiry into Poverty and Exclusion (Commissione di indagine sulla povertà e sull'emarginazione, 1998), some expenditures on education and health were also considered in the 2005 basket, since the previous assumption about their total gratuity had been only partially confirmed by data from the Household Budget Survey (HBS).

Based on the analysis of consumption expenditures, goods and services actually paid for by households were then included in the residual component. The need that households had to meet from their own resources for education up to upper secondary school was limited to copybooks, stationery and other support materials (such as backpacks and pencil cases). As for health, dentist, gynaecologist, medicines, health and therapeutic equipment and care for the disabled and elderly were found to be effectively paid for by households, even taking into account the supply from the National Health Service (Istat 2009, p. 23).

Once essential needs were identified, the monetary value of food, housing and residual components was defined, using primarily consumer price information and, where not available, consumption expenditure data from the HBS.

As for residual expenditure, based on data from the Italian Household Budget Survey, it is highly dependent on the individual characteristics of household members, both in level and composition, and is less sensitive to the effect of economies of scale than are expenditures on housing, heating, household utilities or

the purchase of durable goods. For these reasons, as in the 1997 basket, it was assumed that the residual component is affected by household composition in a similar way to food expenditure. Therefore, based on the observed association, at the household level, between food expenditure and residual expenditure, as measured by the HBS, multiplier coefficients were estimated to be applied to the monetary value of the food component to obtain that of the residual component (Istat, 2009, p. 24). The linear regression model used for estimating these coefficients related the logarithm of residual expenditure to the logarithm of food expenditure (inclusive of meals and food away from home) by also including the effect due to the age composition of household members. On the basis of the estimated values of these coefficients, the monetary value of the residual component, for a household of size z in geographic breakdown k, was obtained in relation to the value of the food basket (for more details, see Section 3).

In the process of revision started in 2022, the overall methodological framework for estimating the residual component remained unchanged, but included:

- the updating of the linear regression model for estimating the above mentioned coefficients, with particular reference to the composition of the basket of goods and services that make up the residual expenditure;
- the revision of the food basket to be used for estimating the monetary value of the residual component.

2. The composition of the residual basket

Before approaching the topic of its composition, the 2005 residual basket was first converted into the new COICOP 2018 classification, adopted by the HBS from 2022 onwards, the base year of the new absolute poverty basket, replacing the previous version of the same consumption expenditure classification.

With regard to the individual goods and services that comprise it, since it was not possible to identify a general revision criterion, the updating process was guided by the expertise of the Commission members and, where necessary, by insights of a different nature (e.g., regulatory, as in the case of education or health).

Below, with reference to some of the macro categories of the residual component (housing, clothing, communications, transport, health, education, other), the main issues that emerged and the choices made are summarized.

2.1. Expenditure on health

In 2005, even in the context of a public health care system, the assumption that health care would be totally free appeared to be at least partly outdated by the analysis of household consumption expenditures from the HBS, from which it appeared that, as a result of intervening changes in health care regulations, households were actually paying for medicines, which at that time were purchased by 27 percent of poor households.

From the analyses carried out in 2005, the health needs of households residing in Italy thus seemed to be able to be met by the National Health Service (NHS), with the exception of some expenditures that could weigh even considerably on the household budget: dental care, gynaecological care, special long-term care, and the purchase of medicines. Since they were generally not covered by the SSN, they had to be assumed to be paid for by households (Istat, 2009, p. 60).

Expenditures on dentist and gynaecologist (the latter derived pro quota from total expenditure on specialist visits, based on data from the 2005 Istat Multiscope Survey on Health and Health Services) were included in the residual basket in 2005, since both were excluded from the Essential Levels of Care that should be guaranteed by the National Health Service, and because for both there was high incidence of use of paid specialist visits (based on data from the Istat 2005 Multiscope Survey). By Prime Minister's Decree of January 12, 2017[5], the Essential Levels of Care were updated, substantially overcoming the exclusion of gynaecological specialist visits from the list of services guaranteed by the National Health Service (see Articles 24 and 59 of the 2017 DPCM), while this was only partially done for dental expenditures (see Article 16 paragraph 5 and Annex 4c of the DPCM).

Given that the most recent data from the Istat Multiscope Survey on Health and Health Services, regarding the use of paid specialist visits, is almost 10 years old (2013) and therefore does not contribute to a sufficiently up-to-date overview, the hypothesis that the National Health Service cannot ensure the minimum necessary for medical treatments appears weakened, at least with reference to expenditures on specialist gynaecological visits. Thus, the Commission determined that expenditures on dental care should remain in the macro health category of the residual basket while expenditures on gynaecological specialist visits should be excluded.

Then as for medicines, they were included in the residual basket in 2005, since they were only partially included in the aforementioned Essential Levels of Care. In fact, although since 2000, all forms of patient participation in pharmaceutical care have been abolished nationwide, without providing any co-payment and distinguishing only totally free medicines from totally paid-for medicines (class C),

[5] https://www.gazzettaufficiale.it/eli/id/2017/03/18/17A02015/sg

most regions, in order to cope with their deficits, have introduced specific forms of participation in pharmaceutical expenditure (co-payment) on band A (mutable) medicines, which generally consist of a fixed fee per prescription or per package, also identifying the categories and individuals who are exempted from it[6].

The most recent data on household consumption expenditures show that nearly half of households in the first fifth of total equivalent consumption expenditure distribution incur expenditure on medicines, although the HBS data also include all cases where expenditures refer only to co-payment. Thus, the Commission confirmed the inclusion of expenditure on medicines in the health macro category of the residual basket.

Moving on to expenditures for private care provided to the elderly and/or disabled at home (by cohabiting and non-cohabiting staff) and for care provided in facilities (such as nursing homes or residential centres), it should first be noted that in 2005, expenditures on special and long term disability care were included in the residual basket because they were excluded from the Essential Levels of Care.

As of today, the situation is not too different: even taking into account the aforementioned update of the Essential Levels of Care, for assisted living residences with a public character there is in fact citizen cost-sharing[7] (see Article 30 of the 2017 DPCM). In addition to this, private home and non-home care is substantially paid for by households. Therefore, the Commission has decided to keep the related expenditures in the health macro category of the residual basket.

2.2. Expenditure on transport

In 2005, transport expenditure was estimated based on the assumption that households travel using only public services (bus, coach, train) and therefore they do not possess private means of transport (Istat, 2009, p. 59).

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[6] Ministry of Health website:
https://www.salute.gov.it/portale/esenzioni/dettaglioContenutiEsenzioni.jsp?id=4674&area=esenzioni&menu=vuoto

[7] The November 2001 D.P.C.M. dedicated a passage (Annex 1C) to social and health integration, that is, to services in which the health and social components were not operationally distinguishable and for which a percentage of cost was agreed upon that was not attributable to the financial resources allocated to the National Health Service. This percentage of cost not attributable to the National Health Service was covered by the municipalities - as they were responsible for the costs of social services - or by the user. In addition, Annex 3, letter d) of the November 2001 D.P.C.M. stipulated that within the framework of social-health integration, the specification of services paid for by the National Health Service had to take into account the different levels of dependence or non-self-sufficiency, and that the basic reference on the regulatory level was the act of guidance and coordination on social-health integration set out in the D.P.C.M. of February 14, 2001.

It has been debated whether that assumption should be revised taking into account the use of the car as an essential means of transport to avoid serious forms of social exclusion in light of the unequal characteristics across the country of the supply of public transport services.

It should be pointed out that introducing it into the residual basket would have meant, operationally, providing for the inclusion of:

- expenditure on car insurance;
- expenditure on car fuel (gasoline and diesel);
- expenditure on car maintenance and repair;
- depreciation rate related to the expenditure on the purchase of a used car.

An increase of this magnitude would have had a significant impact on the level of residual expenditure and, consequently, on the overall value of the absolute poverty basket.

It was also noted how the need for private transport could be declined from different perspectives, potentially having to do with the demographic characteristics of the individuals (e.g., age), where one lives (impervious areas, as well as suburban areas of urban areas), and individual health conditions (presence of disabilities), to name the main factors. If these possible articulations were to be taken into account, the private transport expenditure to be considered could not be limited to the items already listed, but should extend to scooter, bicycle, electric scooter, cab, car-sharing, and so on. That is, one should necessarily move in the direction of reference budgets, i.e., absolute poverty baskets specific to population subgroups with certain characteristics.

The potential introduction of the use of private transport would thus have opened the way for a substantial rethinking of the methodology adopted by Istat for estimating absolute poverty, in contrast to the approach taken by the Commission of considering it substantially valid. In addition, it should be said that, compared to 2005, the current situation of public transport in our country, despite persistent territorial inequalities, has not undermined the assumption that exclusive use of public transport can be considered sufficient to avoid serious forms of social exclusion. Therefore, the transport macro category has remained unchanged.

2.3. Expenditure on education

In 2005, even in the context of a public[8] education system, the assumption of completely free education had been exceeded by actually considering the

[8] Education until the age of 16 (until, therefore, the third year of upper-secondary school) is compulsory and, therefore, must be free. Until enrolment in the third year, in fact, households are not required to pay tuition fees if the student attends a public school.

expenditure on copybooks, stationery and other materials such as backpacks and pencil cases to be paid by households.

In addition, expenditure on day care services, which can be assimilated to education expenditure, was included in the residual component. This choice resulted from two factors: first, this kind of services is regulated at the municipal level; second, it is not always possible to guarantee all disadvantaged households the possibility of using it free of charge due to the different supply in the area in terms of both places and fees (Istat, 2009, p. 60).

The most recent data on household consumption expenditures now show further cracks in the assumption that basic education expenditures are fully paid for by the state and, at the same time, show the need for minor revisions compared to the choices made in 2005. More specifically, in more recent years, when looking at education expenditures actually paid by households, those for:

- textbooks for upper-secondary education,
- fees and tuition for public upper-secondary education,
- textbooks for lower-secondary education,

result to have a significant weight, in addition, of course, to the expenditures already in the basket. Moreover, these are expenditures for which the spending frequencies among households in the first fifth of the total equivalent consumption expenditure distribution are higher than those observed among total households.

On a closer examination of the legislation:

- on the subject of the right to education, the Ministry of Education guarantees the provision of funds to the Regions for the supply of textbooks in favour of less well-off pupils in compulsory and upper secondary education. However, the definition of the Indicator of the Equivalent Economic Situation reference values to access these grants is left to each Region, which, in some cases, can divide the eligible households into groups, to be given credit according to the available funds;
- on the subject of education fees[9], these are due for attendance of the fourth and fifth year of upper-secondary education schools for enrolment, attendance, examinations (suitability, supplementary, licence, baccalaureate and qualification) and the issuing of the related diplomas. There is total exemption for students belonging to households whose Indicator of the Equivalent Economic Situation is equal to or less than 20 thousand euros, provided that the students have a behaviour score no lower than 8, have not incurred disciplinary sanctions of more than 5 days, and are not repeating students (except in cases of proven infirmity);

[9] Ministry of Education website: https://www.miur.gov.it/tasse-scolastiche/contributo

- on the subject of school contributions[10], on the grounds of the principles of compulsoriness and gratuitousness, compulsory contributions of any kind or nature may not be required from households for the purpose of carrying out curricular activities and activities related to the fulfilment of compulsory education (photocopies, teaching materials or other). Exceptions to this, however, are reimbursements for expenditures incurred on behalf of the households themselves (such as, e.g., student individual civil responsibility and accident insurance, absence booklet, school trips, etc.). They can also be requested voluntary contributions with which households, in a spirit of cooperation and with the utmost transparency, participate in the improvement and expansion of educational offerings to pupils, in order to achieve higher levels of quality. These contributions are deliberated by the School Boards, based on school needs: the regulations state that it is illegitimate to make the enrolment of pupils conditional on the prior payment of the contribution and that a student who has not paid it cannot be discriminated against in any way. In practice, however, there is widespread lack of transparency in this regard on the part of schools.

In light of these findings, the Commission has agreed to include in the education macro category of the residual basket expenditures on: textbooks for upper-secondary education; fees and tuition for public upper-secondary education; textbooks for lower-secondary education. In addition, of course, to keep in the basket the expenditure related to day care service.

Finally, there was much debate about whether or not to include canteen fees (nursery, early childhood and primary education, lower-secondary and upper-secondary education) in the minimum necessary to get educated (the domain to which they can be referred). According to the legislation, in fact, school canteen service is managed by municipalities, which formulate their own management regulations and possible conditions of exemption (or reduction) from the payment of this service. In general, however, indigent households are provided with the service free of charge. Therefore, the Commission has found it reasonable to confirm the removal of this service from the list of those potentially to be included in the education macro category of the residual basket.

2.4. Expenditure on games of chance

Expenditure on lotto and other games with cash winnings was included in 2005, in the macro category Other, with the meaning of “tax on hope” (intended as an

[10] Ministry of Education website: https://www.miur.gov.it/tasse-scolastiche/contributo

attempt to find a way to change one's condition). In reality, this expenditure should not be part of residual basket since it does not contribute to define the minimum necessary in any of the areas covered (furnishing and maintaining the dwelling, dressing, communicating, being informed, moving on the territory, getting educated and keeping healthy). Therefore, given that the assumption of its inclusion in the residual component basket appears objectively fragile and it would enlarge the basket to other expenditures (as discussed in Section 2.2), and furthermore taking into account the well-known phenomenon of under-reporting referred to this item in the HBS, the Commission has approved its removal from the residual basket.

2.5. Outdated expenditures

Regarding the overall composition of the residual basket, in addition to those described, some choices were also made regarding expenditures included in 2005 but now considered outdated, as summarized below:

- macro category Housing

Expenditures on (a) kitchen disposable items, (b) repair and/or rental of large electric or motor tools, (c) paintings, mirrors, ornaments and other furnishings, and (d) repair of furniture, furnishings and carpets, were eliminated. Expenditure on repair of home appliances and household equipment was also included in this macro category.

- macro category Communication

Expenditures on (a) fixed telephone equipment, (b) calls from public telephones and phone cards, (c) internet point and other internet connection charges, (d) telegrams, faxes and other telecommunications services, (e) letter forwarding service, (f) repair of televisions, DVD players, hi-fi systems, personal computers, cameras, camcorders, optical instruments, musical instruments, (g) radios, mp3 players/recorders, and other non-portable/portable devices for audio reception, recording, and reproduction, and (h) repair of home appliances and household equipment, were eliminated;

- macro category Other

Expenditures on (a) board games, video games, collectors' and model-making items, (b) newspapers, (c) weekly and monthly magazines and other periodicals, and (d) moving and storage services, were eliminated.

3. The model specifications

In the process of revision of the residual component started in 2022, the updating of the linear regression model for estimating the coefficients to be applied to the monetary value of the food component to obtain that of the residual component[11] played a key role, because it is precisely on the basis of the estimated values for the parameters of this model that, according to the 2005 methodology, the estimated residual expenditure, for a household of size z (with z_1, …, z_6 members in the 1st, …, 6th age class, respectively) in geographic breakdown k, is obtained in relation to the value of the food basket (where the 6 age classes are: 0-3, 4-10, 11-17, 18-59, 60-74, 75 and more) (Istat, 2009, p. 60).

The regression model adopted so far is without an intercept, which complicates its reading, both because, in this case, the coefficient of determination R^2 does not return the share of variance explained, and because the reference for interpreting the parameters that the model itself produces is missing. Therefore, the Commission approved the switch to the use of the model with intercept. In addition, compared to the 2005 specifications, the Commission has determined to also include in the model the β_1 parameter referring to the number of household members aged 0 to 3 years, since its previous exclusion from the estimation procedure was not clearly justified. Finally, in analogy to the choices made for the food component, the age groups considered increase from 6 to 7 compared to the 2005 specifications, due to the splitting of the 18-59 age group into the two subclasses 18-29 years and 30-59 years.

The model specification is thus as follows:

$$\ln(re) = \gamma + \alpha \cdot \ln(sap) + \sum_{j=1}^{7} \beta_j \cdot z_j \qquad (1)$$

where *re* is residual expenditure, *sap* is food expenditure inclusive of meals and food away from home, and z_j is the number of household members in the j-th age group (0-3, 4-10, 11-17, 18-29, 30-59, 60-74, 75 and more).

The Commission debated extensively on the introduction of a spatial breakdown of the model by geographical breakdowns (North, Centre and South), without which it was doubtful that the estimated parameters were actually able to capture the substantial inhomogeneity in the supply, across the country, of some of the services included in the residual expenditure, such as, for example, those for care, health and education.

However, estimates from the model with spatial breakdown on the most recent data from the HBS show how the introduction of such a breakdown produces the

[11] As explained in the paragraph 1, the linear regression model for estimating the coefficients relates the logarithm of residual expenditure to the logarithm of food expenditure (inclusive of meals and food away from home).

paradoxical result of leading to relatively higher poverty incidence estimates where (North) there are more public services (e.g., day care centres, canteens), because expenditure to use them is higher, while the opposite happens in areas where those same services are lacking or completely absent (South). In other words, in the model with spatial breakdown, the parameters estimated for households in the South (who spend little or not at all because services are lacking or unavailable) are smaller than those estimated for households in the North. Consequently, the threshold of the residual component is lower in the South and, other things being equal, the hardship is underestimated. The latter is precisely the risk highlighted in the most recent literature, which finds that the lack of universal provision of basic services may lead current approaches to poverty measurement to underestimates, raising comparability and identification issues (Lanau *et al.*, 2020).

Not least, from the point of view of model parsimony, the introduction of spatial explanatory variables appears weak, since it does not significantly increase the share of variance explained.

Not using the spatial breakdown of the model thus avoids introducing a bias in the estimates due to inequality in the supply of services across the territory. This choice, which corresponds to the one made by the Commission, is suboptimal compared to a strategy that explicitly takes into account differences in the availability of services, given that ignoring the contribution of services misrepresents the resources available to households and can lead to a misidentification of the poor (Lanau *et al.*, 2020). But this, however, prefigures a radical revision in the design of the methodology for estimating absolute poverty.

Finally, it must be said that adopting a model without an explicit reference to the spatial component means assuming that the difference in the prices of residual goods and services in the North and South of the country is the same as that which exists in the same breakdowns for food goods. This last difference is taken into account through the presence of food expenditure among the explanatory variables in the model.

4. The estimation of the monetary value of the residual component

The last issue addressed by the Commission in the residual component revision process was the choice of the food basket to be used in estimating its monetary value. The 2005 methodology used a food basket to which coefficients summarizing the effect of forms of savings/non-savings at the time of purchase were applied according to household size.

With respect to this approach, it has been reflected that only some of the goods in the residual basket (which includes durable, non-durable and semi-durable goods,

as well as, of course, services), due to their characteristics, are suitable for forms of savings due to discounts or promotional offers (linked to the quantity purchased) or savings packages or maxi formats (e.g., household cleaning products, personal care products), while for many other goods and services this is not the case (e.g., cell phone recharges, dentist, household linen). In order to adequately take into account the different characteristics of residual goods, the Commission therefore considered estimating the residual component as a function of the value of a food basket to which the multiplier coefficients summarizing the effect of the forms of savings/non-savings at the time of purchase were only partially applied, namely obtained as the sum of:

- monetary value of the "scaled" food basket (i.e., to which the savings/non-savings scales were applied) weighted by the weight of the non-durable goods in the residual basket on the residual expenditure (equal to 18.6 percent), being these goods of the same nature as those included in the food basket (e.g., household cleaning products and items, health care items, stationery...);
- monetary value of the "additive" food basket (i.e., to which savings/non-savings scales were not applied) weighted by the weight of all other goods and services in the residual basket on residual expenditure (81.4%).

The use of a food basket "adjusted" in the manner described, in estimating the monetary value of the residual component, mitigates the effects of the forms of savings/non-savings at the time of purchase according to household composition, which are present in the monetary value of the "scaled" food basket, therefore better approximating the nature of residual goods, which have different degrees of sensitivity to savings/non-savings coefficients.

In defining the set of residual non-durable goods for the weighting of the "scaled" food basket, some were not considered because, although non-durable, they appeared, quite clearly, much less "sensitive" than the other non-durables to the savings/non-savings coefficients, namely medicines, medical self-diagnostic devices, and water supply.

Hence, the final set of residual non-durable goods considered for the weighting of the "scaled" food basket resulted in a total of 13 items, all of which fall under grocery, i.e., the set of non-food goods sold at large-scale retail outlets that can be reasonably assumed to benefit, to a similar extent as food, from discounts or promotional offers (linked to the quantity purchased) or from savings packs or maxi formats.

According to the decisions adopted by the Commission, the specification of the equation estimating the residual expenditure, for a household of size z (with z_1, …, z_7 members in the 1st, …, 7th age class, respectively) in region k (the monetary value of the food component being, according to the new methodology, defined on a

regional basis), with respect to the value of the food basket adjusted as described in this section, is therefore as follows:

$$re^{k}_{z_1,\ldots,z_7} = \left(pa\_corr^{k}_{z_1,\ldots,z_7}\right)^{\hat{\alpha}} \cdot \exp\left[\hat{\gamma} + \sum_{j=1}^{7} \hat{\beta}_j \cdot z_j\right] \qquad (2)$$

where *re* is residual expenditure, *pa_corr* is the "adjusted" food basket and z_j is the number of household members in the *j*-th age group (0-3, 4-10, 11-17, 18-29, 30-59, 60-74, 75 and more).

5. Concluding remarks

This paper has described the main changes introduced, with regard to the residual component of the absolute poverty basket, by the Commission in charge of reviewing and updating the absolute poverty methodology. In summary, these changes concerned the composition of the residual basket, the specifications of the linear regression model for estimating the coefficients to be applied to the monetary value of the food component to obtain that of the residual component, and the food basket used to estimate the monetary value of the residual component.

However, the debate that has developed within the Commission with reference to the residual component, in addition to the aforementioned methodological issues, has also raised complex conceptual problems, especially the one relating to the measurement of welfare.

The conceptual approach underlying the current model for absolute poverty estimation is ideally based on what one has to spend to survive in a fairly simplified context (food, housing and barely more), in which the welfare state is not developed. Using such an approach in advanced countries means trying to incorporate within it the elements of differentiation due precisely to the welfare state, which, with its presence, complicates the scenario, since it introduces elements of protection of certain segments of the population or groups of households, to which must be added the substantial inhomogeneity of services offered throughout the country (as happens, for example, for assistance and health care). Still, it should not be forgotten that the lack of public service provision creates inequality: as Saraceno points out, the shortage of early childhood services, full-time schools, an inefficient or inaccessible public health service, poor public transportation, air pollution, and so on can substantively reduce the quality of life of the poorest, differentiating them in their ability to meet needs not only from the better-off, who can turn to the market, but also from individuals and families in the same economic condition who live in

areas of the country better endowed with public goods and in less polluted neighbourhoods (Saraceno, 2023).

These considerations take on particular significance when it comes to the residual component, for which it may make sense to experiment with overcoming a vision based exclusively on monetary expenditure data, with a look also at other components of well-being.

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RE-SCALING THE MONETARY VALUE OF THE FOOD COMPONENT OF ABSOLUTE POVERTY BASKET: REVISION OF SAVING COEFFICIENTS AND ALTERNATIVE APPROACHES[1]

Federico Di Leo, Isabella Corazziari

Abstract. Aim of the paper is to describe the revision of the coefficients for re-scaling the monetary value of the food basket for absolute poverty estimates. This revision is part of the work of the Inter Institution Scientific Commission on Absolute Poverty (IISCAP) set up by Istat to revise and update the current methodology. The methodology proposed by Istat (2009) for re-scaling the monetary value of the food component of absolute poverty basket is based on Households' Budget Survey data and produces scaling coefficients representing savings that a family can achieve. The hypothesis that a household realizes actual savings from various dimensions of choice and that these vary with consumer demographics is well-described in economic literature (Griffith *et al*., 2009) and is confirmed by the evidence. Current Istat methodology primarily reproduces the impact on food expenditure of promotions and surcharges on price levels associated with households' demographics, but it cannot isolate the other influences. The coefficients analysed and described in this paper are mainly based on the vast literature available for the equivalence scales. Therefore, the approach used for the revision of saving coefficients is potentially valid and suitable for new estimates of equivalence scales (Carbonaro, 1985; Betti, 1999). The Commission also defined a roadmap to infer the impact of discounts and surcharges on prices with the introduction of models based on prices/quotations from digital transaction recorded at the cash registers (Scanner Data).

1. Introduction

Food consumption is not only the result of individual behaviours; households' expenditure derives from the sum of quantities consumed by each member and is associated with a reference price. The total is not influenced by economies of scale arising when households with multiple members share common goods (e.g., as occurs with electrical appliances), but on the possibility of discounts.

[1] The work is the result of the overall contribution of the authors. However, paragraphs 2.1, 2.2 and 3. are attributable to Federico Di Leo, while paragraphs 2.3 and 2.4 are attributable to Isabella Corazziari. For details on the revision of the main components of the absolute poverty basket see the Special Issue on "New approaches for measuring poverty: studies and perspectives", published in *Rivista Italiana di Economia Demografia e Statistica*,Vol. LXXVIII, No. 4.

As the household size increases, there is the possibility to enjoy economic offers and/or to buy bigger packaging with lower prices per product unit. This hypothesis relies on the theory of differential buying behaviour (Griffith *et al*., 2009). Households' demographics influences food expenditure as it was empirically verified when studying consumption behaviours from the Household Budget Survey (HBS) data provided by the Italian National Institute of Statistic (Istat).

Current Istat methodology for re-scaling the monetary value of the food component of absolute poverty basket is obtained from the direct addition of individual expenses and a subsequent application of the specific coefficients. Such coefficients allow adjusting the households' spending according to saving opportunities. In principles they rely on packaging differences, geographical distribution of selling places, availability of discounts, depending on budget constraints and the actual possibility of purchasing in the large-scale retail trade (GD).

The final food basket monetary value results by increasing or decreasing the initial additive value according to the family dimension; a reference. dimension which is not associated with savings or not-savings is also estimated.

As it is not yet possible to obtain saving coefficients based on recorded prices of food goods and on households' choices, they are estimated from the parameters of specific regression models that are going to be described in the present work.

In order to model the households' saving behaviours Istat utilised an approach derived from the one applied to estimate the equivalence scale, known as the single-equational approach. The equivalence scale aims at assessing the "relative amounts of money two different types of households require in order to reach the same standard of living" (Muellbauer, 1977). When dealing with saving/not-saving coefficients the aim is to introduce economies of purchase and assessing the final basic monetary value of the considered basket, in this case the food one.

To estimate the saving/not saving coefficients (henceforth SCoef) we will refer, as already said, to the single-equational model developed in case of the equivalence scale, based on the food ratio approach according to Engel (1895).

2. Saving/not-saving coefficients: overview

2.1. The data

The data used to study the saving behaviors and to fit the selected model are derived from the Italian HBS, performed by Istat. Data refers to different waves of the survey. The first wave started in 2005 until 2013, the second from 2014 (2013

data were used only for the reconstruction of the time-series) to 2021, the third wave started in 2022 (with 2021 quarters used for the reconstruction of the time-series). In various sections of this paper we will reconsider the differences between the three waves.

2.2. The current methodology

Saving/not-saving choices in customers' buying behaviours were observed in Italian HBS data since 2005, year of reference for the methodology to assess the absolute poverty (Istat, 2009) which has been revised in 2023.

It has been observed that the mean food expenditure per-capita decreases as the household's size increases. Larger families spend less by unit of products on average (Table 1) and such saving occurs for any type of household. Such decrement remains when focusing on families with lower capabilities of expenditures, i.e., those belonging to the first quintile of the total equivalent expenditure distribution.

Table 1 – *Monthly mean food expenditure per-capita of families (2005).*

Number of family's members	Year 2005			
	North	Centre	South and Islands	Italy
One	310.2	285.1	269.3	293.7
Two	221.8	221.2	200.1	215.9
Three	175.8	181.9	167.4	174.5
Four	149.2	155.7	142.5	147.6
Five	134.6	140.1	127.7	132.0

Source of data: Elaborations on the Istat HBS

Considering more recent data referred to 2019, the same pattern of food expenditure per-capita has been observed (Table 2).

Table 2 – *Monthly mean food expenditure per-capita of families (2019).*

Number of family's members	Year 2005			
	North	Centre	South and Islands	Italy
One	308.8	324.0	316.1	314.2
Two	255.2	255.5	240.7	251.1
Three	193.6	206.2	182.5	192.4
Four	164.8	171.5	158.8	163.8
Five	147.8	157.1	134.2	143.1

Source of data: Elaborations on the Istat HBS

This evidence suggested that the revision of the methodology to assess the absolute poverty and to evaluate the monetary food basket value, can be based, initially on an updating of the SCoef estimated in 2005.

2.3. The initial model and some attempted revisions

The regression model developed in 2005 to estimate the SCoef was fitted on food and total expenditure with covariates related to the household's size and the geographical area of residence, from the data of the Italian HBS.

The logarithm of food expenditure is modelled as:

$$\ln(sa) = \alpha + \beta \cdot \ln(st) + \gamma \cdot \ln(nc) + \delta \cdot ds + \xi \quad (1)$$

where *sa* indicates the household's food expenditure and *st* the corresponding total one; *nc* is the number of family's members and *ds* is a dummy variable indicating the geographical area (1 for South and Islands and 0 otherwise).

The model was based on a selection of households to consider the most common consumption behaviours. Firstly, households with less than 5 members were selected as it was the more frequent families' size in the survey. Among them, the ones with all members aged 18-59 were chosen, on the hypothesis that their consumption behaviour is homogeneous. The aim was to avoid adjustments of the basket due to the presence of children or teen-agers, or of very old people.

Households with high or low share of food expenditure on the total were excluded (first and last quintile of the ratio between food and total expenditure, by family's size). Families purchasing meals and drinks outdoor were excluded too.

Finally, due to the small size of the sampled households, regression was shaped considering a sample referring to the three adjacent years 2003-2005 to assure a more robust model. Expenditures in previous years were adjusted to 2005 by multiplication with the median ratios (2005 vs previous year) of food and total expenditure.

From the parameters estimated in (1) the value the variable ϵ was obtained as follows:

$$\epsilon = \frac{\gamma}{1-\beta} \quad (2)$$

where ϵ^2 is the elasticity providing the SCoef by household size and geographical areas. When $\epsilon < 1$ the hypothesis that larger families (more than 3 members) realize savings is confirmed. The coefficient ϵ in 2005 was 0.76.

The final step to calculate the SCoef was to identify the household size benchmark.

The household size is the one with no saving/not-saving possibility: three components household is the size for which forms of saving/not-saving are assumed to be nil. This size has been estimated comparing the mean food expenditure of the households belonging to the first quintile of the total equivalent expenditure distribution and the additive food basket.

To evaluate the monetary value of the food basket, the minimum price collected in each region's capital represents the minimum price for the most frequently sold reference (not of all the available ones) in the sampled selling points (Istat, 2009).

The SCoef is calculated for each family and applied to the additive basket referred to the family size [*nc*], according to the following formula:

$$\mathrm{SCoef}_{nc} = \frac{3}{nc} \cdot e^{\left(\epsilon \cdot \ln\left(\frac{nc}{3}\right)\right)} \tag{3}$$

The first attempt to update the saving/not-saving coefficients started in 2016 following the indications of the "Inter-Institutional Working Group"[3]. The Group provided several indications; among them, to use the new survey conducted with Computer Assisted Personal Interview (CAPI) started in 2014 with a comparing sample in 2013, and the traditional one in Paper and Pencil Interview (PAPI) lastly undertaken in 2013, by replicating the model used in 2005. In both cases, the model was applied considering a two-year sample of the survey instead of three[4]. For the PAPI model the referred to years 2012-2013 while for the CAPI polling sample refers to years 2013-2014[5].

Results from the two reference years 2013 and 2014 referring respectively to the samples PAPI and CAPI did not provide evidence about the need to update the methodology[6].

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[2] Details about ϵ, and its link with the Engel's law can be found in the volume Istat (2009), p. 43-45. As ϵ is obtained considering the ratio between the food and the total expenditures, given the model (1), the geographical area effect disappears.

[3] Delibera N.8 della Presidenza dell'Istat del 22 ottobre 2015.

[4] The current sample is larger than the 2005 one, allowing to change decisions about how many surveys to consider as the pool of data.

[5] 2013 was the last survey year for the old PAPI survey. The CAPI survey is available since 2014 with a pilot run for the year 2013. The parallel run (PAPI-CAPI) is the basis for the time series reconstruction.

[6] Cf. MASI A. Room Document produced for the Istat Inter-Istitutional Working Group on Absulte Poverty, Roma, 2016.

The PAPI elasticity ϵ_{2013} was greater than the 2005 one (0.81 vs 0.76) but did not cause significant differences in poverty estimation with respect to corresponding estimate based on the 2005 elasticity. Indeed, the new 0.81 elasticity would have caused a decrease in the incidence of the family's poverty between -0.1% and -0.2%, while the individual poverty incidence would have not changed.

The CAPI elasticity ϵ_{2014} was close to 1. Consequently, the use of the new survey data suggested reconsidering the criteria about the households' selection to fit the model, in particular the exclusion of families with too high or too low food expenditures with respect to the total expenditure.

The Inter-Institutional Scientific Commission (IISCAP[7]) introduced firstly an update of the elasticity and the related SCoef using 2018-2019 data (two years pooling), i.e. close to the final reference year 2022. It was inevitable to avoid the use of 2020 and 2021 data due to the COVID-19 pandemic that strongly affected costumers and families' behaviours and consequently survey estimates. After the 2019 exercises, the 2022 data have been used to fit the final model.

Parameters estimates in relation to the model (1) and corresponding elasticity ϵ_{2019} were similar and not statistically too different from the corresponding values in 2005. Considering different selection of families, the corresponding elasticities were $0.73 < \epsilon_{2019} < 0.81$.

2.4. Methodology update

The first working hypothesis proposed by the IISCAP has been the introduction of new variables related to the residence area of the families as the type of municipality. Other variables to be tested in the model refer to the families' members characteristics: age expressed by both the mean age of the members and the variance; the percentage of females. The model fit improvement due to the introduction of the new variable has been not so relevant.

The IISCAP discussed the possibility to explore also different models as for example simultaneous equation models and complete economic systems.

However, quotation from Scanner Data can be the best solution to assess the saving/not-saving behaviours considering observed prices of different packaging by product. Such solution requires long in-depth analysis to implement a valid outcome using prices of many different products, with different packaging and from different retailers. Prices from traditional retailers, especially for fresh food products, must be integrated with Scanner Data.

[7] Cf. ISTAT DOP/932/2021 16 December 2021.

The final revision considering in-depth analysis constraints, confirmed the use of model (1) considered as a reasonable solution even if not the optimal one.

The revision was mainly focused on studying the effect of different selections of the households included in the model, and the possibility to use only one year data survey instead of a pooling (2022).

The following three nested scenario have been tested.

a. As regards to the two expenditures considered in (1), total - *st* - and food - *sa* - the estimates were based on selected products as considered in the new basket of absolute poverty. In particular, we discarded products not included in the basic food basket, i.e. products too expensive or not included in the diet defined by the Nutritional Institute as the minimal one[8]. From the total expenditure are excluded extraordinary maintenance costs, life insurances and annuities expenses. People aged 18-69 instead of 18-59 as previously done were chosen to consider demographic changes in the population, its aging in particular.
b. After the first scenario, it was decided to consider families with a small spending for meals and drinking outside the house, i.e., families with such spending lower of the corresponding median, still discarding families with higher spending for meals or drinking outdoor.
c. As a third step, we have discarded families with uncommon behaviour in term of food expenditure. In particular, the discarded families were characterized by nil spending in the last two weeks on fresh fruits and vegetables, breads, meat and cheese. Using new variables in the questionnaire referring to the place of spending, especially for frequent used products it was possible to identify these families[9]. To define such behaviour as uncommon we used other variables, i.e., the notes of the interviewers. We found that some families have no income; others received money from relatives living in other houses, were guests in other houses living with a disability pension, did not go out due to health problems taking meals at relative's home, or ate at work etc.

The analysis based on the three above scenarios (Table 3) which are a final selection from different hypothesis, provides the coefficients estimates of (1), required to finally assess the impact of saving/not-saving behaviours. In particular it was possible to determine the impact of the saving/not-saving scale on the absolute poverty, provided by the third scenario, the one based on a more complete set of hypotheses.

[8] Cf. CORAZZIARI I. *Il modello e le stime delle scale di risparmio / non risparmio*, Room Document, Roma, 2022.
[9] Cf. DI LEO F. *I luoghi di acquisto nell'indagine sulla spesa delle famiglie*, Room Document, Roma, 2022.

Table 3 – *Regression parameters to calculate elasticity ϵ (2019).*

Model (1) parameters	Selection of families		
	Scenario a)	Scenario b)	Scenario c)
α	1.899	1.988	2.043
β	0.461	0.445	0.451
γ	0.394	0.419	0.354
δ	0.092	0.103	0.091
ϵ	0.732	0.755	0.645
R^2	0.502	0.522	0.508
F Value	632.010	1,261.670	894.930
Selected Observations	1,887	3,476	2,600

Source of data: Elaborations on the Istat HBS, wave 2019

The final choice about the selection of the families to fit the model are:

a. Households not belonging to the first or last quintile of the food expenditure per-capita distribution obtained for different household sizes. We discarded families spending for food too less or too much compared to the corresponding mean.
b. Households with at most 5 members, all aged between 18 and 69 years, according to the hypothesis that they behave more homogenously, avoiding adjustments in the food basket due to the presence of children or teenagers, or older people.
c. Spending per-capita for meals and drinking outdoor less than the median (about 1€ per-capita, or about 30€ monthly).
d. Households were excluded with no spending on products considered as necessary, as fresh fruits or vegetables, meat, cheese, bread in the last two weeks before the interview.

Note that elasticity is estimated on a selection of families according to the homogeneity considerations, but it is applied to the spending of all the families.

Main differences in terms of saving/not-saving coefficients (Table 4) refer to families of singles or more than 4 members. Introducing such differences in the final estimate of the absolute poverty determined an increase of poverty level for singles and a reduction for large families.

A simulation about the absolute poverty estimates has been performed on 2019 data, to compare individuals and households' absolute poverty between 2005 and 2019.

Table 4 – *Saving/not-saving coefficients - years 2005 and 2019.*

Number of families' members	Coefficients	
	2005	2019
One	1.302	1.477
Two	1.102	1.155
Three	1.000	1.000
Four	0.933	0.903
Five	0.885	0.834
Six	0.847	0.782

Source of data: Elaborations on the Istat HBS

New coefficients affect the households' poverty incidence increasing from 6.4% to 6.9%, i.e., of about 123.000 families (greater impact in the North), but do not affect individual incidence (Table 5).

Table 5 – *Absolute poverty incidence by geographical areas - Year 2019, in thousands and percentages.*

	North		Centre		South and Islands		Italy	
	2019	2019(c)	2019	2019(c)	2019	2019(c)	2019	2019(c)
Poor Families	729	793	242	255	709	754	1,679	1,802
Resident Families	12,474	12,474	5,337	5,337	8,268	8,268	26,079	26,079
Poor People	1,859	1,891	661	660	2,059	2,043	4,580	4,595
Resident People	27,508	27,508	11,894	11,894	20,370	20,370	59,772	59,772
Poverty Incidence %								
Families	5.8	6.4	4.5	4.8	8.6	9.1	6.4	6.9
People	6.8	6.9	5.6	5.5	10.1	10.0	7.7	7.7

Source of data: Elaborations on the Istat HBS

Poverty incidence for singles would increase from 5.7% to 7.1%, slightly higher than the total households' one and lower than the individual one. Such increment looks coherent with studies about poverty indicating that the eldest living alone and larger families experiment increasing poverty levels.

2.5. Results 2022 and the new poverty estimates

Table 6 shows the new saving/not-saving coefficients from model (1) fitted on 2022 survey, evaluated according to the c) scenario.

Table 6 – *Saving/not-saving coefficients – years 2005, 2019 and 2022.*

Number of families' members	Coefficients		
	2005	2019	2022
One	1.302	1.477	1.504
Two	1.102	1.155	1.162
Three	1.000	1.000	1.000
Four	0.933	0.903	0.899
Five	0.885	0.834	0.827
Six	0.847	0.782	0.773

Source of data: Elaborations on the Istat HBS, waves 2003-2005; 2019; 2022

Table 7 shows the regression results for model (1) fitted on 2022 data evaluated as indicated in scenario c).

Table 7 – *Regression parameters to calculate elasticity ϵ (2022).*

Model (1) parameters	Selection of families		
	Scenario a)	Scenario b)	Scenario c)
α	1.915	1.980	2.182
β	0.452	0.442	0.430
γ	0.444	0.441	0.358
δ	0.138	0.142	0.139
ϵ	0.809	0.790	0.629
R^2	0.508	0.518	0.501
F Value	1,373.54	1,956.98	1,325.83
Selected Observations	3,990	5,461	3,958

Source of data: Elaborations on the Istat HBS, wave 2022

The choice of one year only dataset reduces the number of observations used to fit the model consequently increasing the errors of the parameters estimates and decreasing the overall index of fit R-squared adjusted for multiple explicative variables in the model. At the same time in 2022, the total sample was larger, so the number observations provide more robust estimates than what obtaining by testing the model on year 2019.

Comparing the 2022 regression goodness of fitting indicators with the ones obtained in 2005, we can note a worsening of the overall model fitting. A model based on the size of the family, the share of the food spending on the total one and by a dummy variable distinguishing only the South and Islands by the rest of Italy seems to become more and more rigid to describe families' saving/not-saving behaviours. Such behaviours are conditioned also to the availability of offers of cheap products at reasonable distance from home.

The coefficients effect on food expenditures is equivalent in all the Italian regions. If we consider the value of the food basket of Lombardia, Lazio and Campania for a family made by adults only (30-59 years) the amount for a single is respectably 298.15€, 276.83€ and 245.72€. For six members [nc = 6] household the amount is approximately three times, i.e., (nc*SCoef$_{nc}$ [0.773] / SCoef$_1$ [1.504]) the basket of a single.

3. Saving coefficients and equivalence scales

Notwithstanding the proposed modelling allows developing interesting research lines, as already stated, the model is implicitly an equivalence scale where we limited the observations used to avoid extreme consumption behaviours.

The proposed approach can be of stimulus to discuss improvements in the estimation of equivalence scale, based on estimation of Engel curves (Betti, 1999).

The elasticity ϵ in (2) is obtained by the double logarithm function used to estimate the Engel curve for food goods (Carbonaro, 1985). Developing the formulas to calculate the SCoef [4] the link with the equivalence scale is evident. In particular, the expression (4) - similar to (3) - is the one used to estimate the "Carbonaro scale", that allows to assess from the Engel curve the same level of utility/well-being for two families, A e B, of different sizes:

$$e^{\left(\epsilon \cdot \ln\left(\frac{nc_a}{nc_b}\right)\right)} \tag{4}$$

The Carbonaro scale is obtained based on the estimated γ and β parameters, with $nc_b = 2$; the saving/not-saving coefficient are calculated with $nc_b = 3$ and multiplying the equivalence scale times the ratio between the size of the considered family and the reference one[10].

Finally, it is possible to compare the equivalence scale (Carbonaro) with the implicit equivalence scale 2022 derived from the coefficient estimated on the revision of saving coefficients (Table 8). The increasing diversification of products can be a possible explanation for the reduction of the coefficients together with other factors which should be analysed and considered like changes in commercial distribution.

[10] As assessed in the past, "the additive food basket per-capita and the mean food spending per-capita of households belonging to the first quintile of food expenditure [HBS] intersect for the family size equal three, that is the reason why the size of the reference family, i.e. the family with no saving/not-saving benefits is 3". (Istat, 2009, p. 44)

Table 8 – *The Carbonaro equivalence scale (1985) and the implicit equivalence scale (2022).*

	Family members						
	One	Two	Three	Four	Five	Six	Seven
Carbonaro scale	0,60	1,00	1,33	1,63	1,90	2,16	2,40
Equivalence scale 2022	0,65	1,00	1,29	1,55	1,78	2,00	2,20

Source of data: Elaborations on the Istat HBS

A different equivalence scale has multiple impacts on inequality measures, like relative poverty measurement and equivalent expenditure. Istat publishes annually several indicators, and it is possible to assess the impact of the implicit equivalence scale (2022) on equivalent-expenditure thresholds (expenditure deciles).

In 2022 the first monthly equivalent-expenditure decile threshold[11] (referring to the less well-off households) was 1,140.98€ while the ninth decile threshold (referring to the better-off households) was 4,735.56€. The distance between the two extreme thresholds was 4.15, i.e., the equivalent expenditure of the "richest household" was more than four times bigger.

With the adoption of the implicit equivalence scale (2022) the distance is relatively smaller (3.99) with a higher first decile threshold (1,144.57€) and a lower ninth decile threshold (4,566.34€).

This paper is not dedicated to the measures of inequality and to the tools to measure it, however the revision of the equivalence scale is an outcome of IISCAP and will be considered in the next future.

4. Concluding remarks

The non-linear relationship between price and quantity of the purchased products is quite clear (Armstrong, 2016). Therefore, it is necessary to consider households' purchasing behaviour and to isolate and measure the impact of promotions and surcharges. Ignoring saving/not-savings behaviour implies biased estimates of poverty. The absolute poverty incidence for households net of saving/not-saving coefficients, would be lower (7.3% instead of 8.3% in 2022) while the number of individuals suffering an absolute poverty condition would increase (from 5.7 to about 6 million in 2022).

The availability of a big database of prices, in particular the Scanner Data, will provide, in the future, the possibility to reconsider the current saving/not-saving

[11] E.g. the value that separates the 10% of households with the lowest equivalent expenditure from the other 90%.

scale. According to a study conducted in the UK and based on Scanner Data "low-income households do not have the flexibility, in terms of storage, transport, or liquidity, to take advantage of sales" while single young households tend to buy more on sales like large families (Armstrong, 2016).

According to this evidence the coefficients proposed in this paper are a partial and imperfect solution to the bias induced by using standard prices for products within the food component of the total households' basket.

The proposed model is not bias-free. The coefficients based on family size only without differentiations based on age or family composition seem to be not fully representative of the different behaviours.

The decreasing of the food per-capita spending as the family size increases can be explained by other than the offers and discounts of the commercial distribution.

One possible alternative explanation can be found in the production of food waste. The domestic food waste is a known and studied phenomenon in literature (Oláh *et al.*, 2022) and in Italy the CREA has created a "Food waste Observatory"[12].

Saving coefficients analyse price non-linearity from the demand side, however it would be challenging to consider the impact on prices of other phenomena from the supply side like shrinking inflation. This point has been considered by the IISCAP to be included in the future work to improve the Istat methodology to estimate the absolute poverty basket.

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NEW DATA SOURCES FOR THE VALORISATION OF THE ABSOLUTE POVERTY THRESHOLDS[1]

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Abstract. Inter Institution Scientific Commission on Absolute Poverty (IISCAP) was established at the National Institute of Statistics (Istat) with the aim of reviewing and improving the methodology used to estimate the incidence of poverty. Several issues were addressed by the Commission, among which the advancements in the valorisation of the absolute poverty lines that were made possible by the availability of new data sources for the scope of official statistics, and specifically by the development of data collection of the survey on consumer prices. These advancements are at the core of the present paper. On the one hand, the assessment of the minimum average prices of food items included in the poverty basket has been greatly improved through the use of transaction data on grocery products coming from the outlets of the modern distribution, already in use for the purpose of the inflation estimate. Moreover, the information provided by the administrative data on rental contracts, which also contributes to the compilation of the consumer price index, allowed the abandonment of the former model approach, based on Household Budget Survey. As a result, the housing component of the poverty line now includes exogenous estimates of the monetary value of rents, based on the Tax Office database, that gives almost a complete picture of all the lease contracts existing in a given year in Italy.

1. Introduction

The review of the methodology used to estimate absolute poverty in Italy was the main goal of the Inter Institution Scientific Commission on Absolute Poverty (IISCAP), established at the National Institute of Statistics (Istat). In the final reports of the Commission subgroups, several innovations were suggested with the aim to update the basket of absolute poverty, that dates back to 2005, and to improve the procedures used to measure the incidence of poverty, taking into account the

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potential of the new data sources that became available in the last decades for the scope of the official statistics[2].

The present paper focuses on the advancements in the valorisation of the absolute poverty lines that were made possible by the development of data collection of the survey on consumer prices. Indeed, the acquisition of transaction data on grocery products coming from the outlets of the modern distribution, already in use for the purpose of the inflation estimate, offers the opportunity for an important enhancement in the assessment of the minimum average prices of the large part of food items included in the poverty basket. In addition, the information provided by the administrative data on rental contracts, which also contributes to the compilation of the consumer price index, allow to replace the former econometric approach based on Household Budget Survey data. Specifically, the monetary value of rents included in the housing component of the poverty line are now exogenously estimated basing on the information contained in the Tax Office database that gives almost a complete picture of all the lease contracts existing in a given year in Italy.

The paper is organized as follows: Section 2 addresses the issue of the estimation of the minimum average prices of the food items in the poverty basket. In particular, in Section 2.1 we will firstly provide a short resume of the methodology used so far to estimate the average minimum price of food products, basing on the traditional price collection, which, with only minor innovations, has still been used for a small subset of products (i.e., fresh food sold in variable weight packages), for which scanner data are not available at present.

Section 2.2 describes in some detail how transaction data have been used for the valorisation of the largest part of food items, focusing on the new approach to the estimation of minimum average prices. The approach, that has been developed within IISCAP aims to make the most efficient use of the new data source. As made explicit, one of the main innovations concerns the selection of references for the estimation of the minimum average price, which is based on the analysis, item by item, of the most representative formats, in terms of packaging type and size.

A synthetic illustration of the Tax Office dataset used for reviewing the monetary value of the housing component of the poverty line is provided in Section 3, in which we sketch the criteria applied to select the subset of lease contracts for the calculation the minimum rental cost per square meter.

The method used to update the food and rental thresholds of the poverty lines in the upcoming years is briefly described in the concluding Section 4.

[2] For a general view on the methodological approach used by Istat to estimate absolute poverty and the innovations introduced following the recommendations of the Inter Institution Scientific Commission, see Freguja and Polidoro (2024).

2. Estimating minimum average prices for food items.

The food component of the poverty basket has undergone major revisions made by the experts of the IISCAP[3] resulting in the enlargement of the basket, which now includes 100 items. However, for the valorization of the food thresholds, the subset of items, for which the minimum average price has to be estimated, is 96[4].

To this aim, the data coming from the consumer price survey have been used. As the first step, a mapping was made which traces each food item included in the poverty basket to one or more elementary products of the consumer price basket[5]. In particular, almost one third of the items (33), relating mainly to fresh products such as fruits, vegetables, meat and some foods usually sold in packages of variable weight, were linked to elementary products for which price information is still coming from the traditional price collection carried out at the provincial level by the Municipal Statistical Offices (MSOs)[6]. For this subset of items, the minimum average prices are estimated according to the former methodology[7], described in Section 2.1.

For the remaining 63 food items of the poverty basket (linked to package products), the minimum average prices were assessed using the new source of the consumer price survey, namely the scanner data source.

The scanner data, indeed, is a powerful source of information, allowing for a wider coverage of stores as compared to the traditional price collection, both from the point of view of channels and the number of outlets (about 4,000), and offering immeasurably much more granular information about the products actually sold in the reference period. In order to make the most efficient use of the information coming from transaction data, a new methodology for the estimation of minimum average prices has been developed within the Commission, which is discussed in Section 2.2.

It is important to stress that, regardless the source of information, the minimum average prices have been compiled at the regional level, using provincially collected prices, in order to allow the estimation of poverty thresholds for the NUTS 2 subdivisions. All estimates are referred to year 2022.

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[3] de Martino *et al.* (2024) discuss in details the meticulous analysis that has been carried out in order to define the new food component of the basket.

[4] See de Martino *et al.* (2024).

[5] A detailed review of the methodology used to compile the consumer price indices and the corresponding basket of products is contained in Istat (2023).

[6] In 2022, the traditional price collection took place in 79 provinces participating to the consumer price survey.

[7] Indeed, a couple of innovations were introduced that improve the approach used to estimate the minimum average prices of the traditionally collected products. Firstly, sales and temporary price reductions were taken into account (they were not in the former approach) and secondly, as stated below, estimates were produced at a more detailed territorial level (i.e., regional level). For an exhaustive illustration of the former methodology, see Istat (2009).

2.1. The traditional price collection for the valorisation of the food sub-component of the poverty basket.

For the fresh food products sold in in packages of variable weight, the information collected at local level by MSOs with traditional techniques was used to estimate the corresponding minimum average prices. In particular, this sub-group consists of 33 food items generally referred to: milk and derivatives; fresh meat; preserved meat; cereals and derivatives; fish and fish products; vegetables and fruit. As a whole, the 33 food items were linked to 113 elementary products included in the Harmonized index of consumer price (HICP) basket. In few cases, the link between the elementary products of the HICP basket and the food items of the poverty basket is one-to-one (this is the case for example of Dried, salted or smoked meat). At the opposite, for Fresh or chilled fruit, 37 elementary products were considered, and 51 for Fresh or chilled vegetables other than potatoes and other tubers.

In order to cover both the modern and the traditional outlets, the minimum average prices were estimated, at the provincial level, by keeping separated the modern retail channel (which includes hypermarkets, supermarkets, outlets with surface between 100 and 400 s.m. and discounts) from the traditional channel (mini markets, traditional shops, local markets).

Formally, let $\{a_i\}$ be the set of the elementary products linked to the food item A and $\left\{p^m_{j,h,k}(a_i)\right\}$ the set of quotations of the j references collected in month m in outlets of type h of the municipality k for the elementary product a_i.

The minimum price $\hat{p}^m_{h,k}(a_i)$ is given by:

$$\hat{p}^m_{h,k}(a_i) = \min_j\left\{p^m_{j,h,k}(a_i)\right\} \tag{1}$$

provided that at least two price offers have been collected (imputed prices were not taken into account).

The aggregation of the minimum prices $\hat{p}^m_{h,k}(a_i)$ involves a series of further steps:

1. The monthly minimum price of the elementary product a_i of the municipality k is calculated by aggregating $\hat{p}^m_{h,k}(a_i)$ across outlet types. Specifically, $\hat{p}^m_k(a_i)$ is obtained as the weighted arithmetic mean of $\hat{p}^m_{h,k}(a_i)$ with weights proportional to the importance of the channels in terms of turnover[8] (Table 1).

[8] The 5-digits level of the ECOICOP classification (i.e. sub-classes) is the lowest level for which the turnover weights of different outlet types are available. Therefore, for all the elementary products included in the same ECOICOP sub-class (or class, in case more detailed information on turnover is not available), the corresponding monthly minimum average price is calculated using the same weighting coefficients.

2. The minimum average price of the month m in municipality k of product A, $\hat{p}_k^m(A)$, is obtained as the weighted arithmetic mean of the monthly minimum prices $\hat{p}_k^m(a_i)$ of the elementary products a_i, using the HICP weights. In a number of instances, however, no explicit weights were available: in this cases, the monthly provincial minimum average of food product $\hat{p}_k^m(A)$ is calculated using the geometric mean of $\hat{p}_k^m(a_i)$.
3. The annual minimum food prices of the province are calculated as the arithmetic mean of the provincial monthly minimum prices.
4. The annual minimum food prices for each region are calculated as the weighted arithmetic mean of the provincial annual minimum prices, with weights proportional to the resident population of the provinces.

For the valorisation of the poverty basket, about 500,000 traditionally collected quotations were handled to calculate the minimum average prices of the 33 food products. The smaller number of quotations was used for Fresh or chilled fish (7,968 quotations), while the largest number for Fresh or chilled vegetables other than potatoes and other tubers (more than 200,000).

Table 1 – *Weights of the modern and traditional retail trade channels used to compile the minimum average prices of traditionally collected food products, by ECOICOP (year 2023).*

ECOICOP	Level	Description	% Modern distribution	% Traditional distribution
01.1.2	Class	Meat	51,6	48,4
01.1.4.5	Subclass	Cheese and curd	51,6	48,4
01.1.6.1	Subclass	Fresh or chilled fruit	41,8	58,2
01.1.7.1	Subclass	Fresh or chilled vegetables other than potatoes and other tubers	62,3	37,7
01.1.7.4	Subclass	Potatoes	62,3	37,7

2.2. The use of scanner data to estimate minimum average prices of processed food products

Since 2018, Istat has been using scanner data of grocery products in the production process of the consumer price indices. In 2022, Istat received data for a sample of about 4,000 outlets, including hypermarkets, supermarkets, discounts,

outlets with surface between 100 and 400 s.m. and specialist drug[9]. The sample of outlets is stratified by provinces and retail trade channels and cover the entire national territory.

Istat receives scanner data on a weekly basis and at item code level (GTIN[10]) for each outlet in the sample. For each GTIN, elementary prices are calculated taking into account turnover and quantities (weekly price = weekly turnover/weekly quantities). Every GTIN identifies a specific product through a series of attributes (manufacturer, brand, possible sub-brand, size, packaging, variety) and all GTINs are classified within the ECR classification[11] which groups homogeneous products in specific markets.

Starting from the database available for the calculation of consumer price indices, Istat has been implemented a new methodology to estimate the average minimum price of the processed foods included in the poverty basket. In fact, the granularity of the information coming from the transaction data allowed a great improvement in terms of temporal and territorial coverage as well as of product offering, as compared to traditional sources of price collection. It also made it possible to include all retail trade channels where households purchase food products.

As the first step, the 63 food products of poverty basket have been linked with transaction data at the lowest level of the ECR classification used for scanner data (i.e., markets). All in all, 171 markets were linked.

The large amount of information provided by scanner data, however, raises the issue of the selection of the references that contribute to the estimation of the minimum average price. As a matter of fact, transaction data refer to products that are generally sold in a wide number of different packaging of different size. For example, the evidence coming from scanner data shows that canned tuna is sold in 14 different types of packaging (single or multi pack, containing up to 24 pieces) and 114 different sizes (ranging from 33gr to 4kg). With the aim of selecting the most representative formats, an analysis has been carried out to identify, product by product, the most sold types of packaging. The selection criterion was based on annual data on quantities sold. As for canned tuna, five different typologies have been selected: three single packs (80gr, 160gr and 200gr) and two multi-packs (3x80gr and 2x160gr).

For the selected typologies of packaging of each food product, the minimum average price has been estimated on a monthly basis at the provincial level, separately for hypermarkets, supermarkets, discounts and outlets with surface between 100 and 400 s.m.. Moreover, unlike the case of the traditionally collected

[9] Small traditional local shops are not covered by scanner data.
[10] The Global Trade Item Number (GTIN) is a unique product identifier that is recognized internationally.
[11] ECR markets are the lowest level of the ECR classification (classification shared by industrial and distribution companies).

price, the use of scanner data allowed us to consider the price distribution of GTINs as the basis for the estimation of the minimum average price[12].

Specifically, the minimum average price (for a given province, month, outlet type and packaging), is obtained as the weighted arithmetic mean of the prices of the lower tail (first fifth) of the price distribution, with weight given by quantities of GTINs sold[13].

Formally, let $B_r = \{b_{i_r}\}$ be the set of the GTINs of the selected package type r linked to the food product B, and $B^m_{r,h,k} = \{b^m_{i_r,h,k}\}$ the subset of the GTINs that belong to the first fifth of the price distribution of month m in outlets of type h of the municipality k.

The minimum price $\hat{p}^m_{h,k}(B^m_{r,h,k})$ is given by:

$$\hat{p}^m_{h,k}(B^m_{r,h,k}) = \sum_{B^m_{r,h,k}} \frac{q^m_{h,k}(b^m_{i_r,h,k})}{q^m_{h,k}(B^m_{r,h,k})} \cdot p^m_{h,k}(b^m_{i_r,h,k}), \quad (2)$$

where $q^m_{h,k}(b^m_{i_r,h,k})$ is the quantity of the GTIN $b^m_{i_r,h,k}$ and

$$q^m_{h,k}(B^m_{r,h,k}) = \sum_{B^m_{r,h,k}} q^m_{h,k}(b^m_{i_r,h,k}). \quad (3)$$

The minimum average prices of the selected packages are then expressed in a standardized unit (price/kg or price/liter) before being aggregated to calculate the monthly minimum average price of food product B sold in the outlets of the same type h and province k:

$$\hat{p}^m_{h,k}(B^m_{h,k}) = \sum_r \frac{q^m_{h,k}(B^m_{r,h,k})}{q^m_{h,k}(B^m_{h,k})} \cdot \hat{p}^m_{h,k}(B^m_{r,h,k}), \quad (4)$$

where $q^m_{h,k}(B^m_{r,h,k})$ is the standardized quantity (expressed in terms of kilos or liter) of product B sold in packages of type r and

$$q^m_{h,k}(B^m_{h,k}) = \sum_r q^m_{h,k}(B^m_{r,h,k}). \quad (5)$$

Minimum average prices $\hat{p}^m_{h,k}(B^m_{h,k})$ are then aggregated across outlet types and provinces of the same region to calculate the monthly minimum average price of food product B at the regional level. For the aggregations the weighted arithmetic

[12] For more details on the methodology see Altarocca *et al.* (2024).

[13] As a whole, for the 63 food products about 12 million quotations have been processed each month. From these, 1,8 million quotations have been monthly selected for the calculation of the 63 minimum average prices.

mean formula is used with weights proportional to the turnover of the different retail channels and, as for the traditionally collected prices, the resident population.

Finally, the regional minimum average price of food product *B* for the reference year (2022) is obtained as the arithmetic mean of the monthly minimum average prices.

3. Tax Office database of rents as a data source for the estimation of the rental component of the poverty line

The use of administrative data for the estimation of the rental component of the absolute poverty lines represents a crucial innovation with respect to the previous methodology based on Household Budget Survey data. In particular, the data source is the database of rents held by the Real Estate Market Observatory (OMI) of the Tax Office, which is used, starting from 2022, for the compilation of the Italian CPI and HICP indices of housing rentals index for private sector[14].

The provision of the database by the Tax Office started in 2017 in the framework of the cooperation between Istat and the fiscal agencies of the Ministry of Economy and Finance. It contains information about all new rental contracts registered in the reference quarter referring to all type of properties (residential and non-residential), covering almost the entire national territory[15], and it is provided 35/40 days after the end of the reference quarter. Specifically, the information provided by the OMI database concern:

1. the contract (the value of rental price, the tax option, the start date of occupancy, the end date of occupancy and sometimes the date of the early termination);
2. the characteristics of the property (cadastral categories, the size in terms of square meters and/or number of rooms, the location of the property in terms of cadastral code, cadastral information as map sheet and number, OMI zone, address);
3. the parties involved (information about landlords and tenants including fiscal code).

[14] As a whole, more than 1.3 million of rental prices are available monthly.

[15] For properties located in the autonomous provinces of Bolzano and Trento and in few municipalities situated in Veneto, Lombardia, and Friuli that are regulated by a different cadastral system some information are missing (specifically, dwelling area in terms of squared meters and the number of rooms).

For the valorisation of the rent sub-component of the poverty line, however, it was necessary to select the statistical units (new and existing contracts[16]) from the OMI database, according to specific criteria.

Firstly, only contracts from private landlords were considered. For this purpose, OMI database was integrated with the information coming from the Statistical Register of active Enterprises (ASIA), using the VAT code of the property owners. By combining the two sources, it was possible to identify the owner type and consequently to distinguish private from social contracts.

Secondly, short term contracts (usually used for study, work or holidays) were excluded while only long term contracts (4+4 years and 3+2 years) were taken into account.

Luxury dwellings (including villas, castles and houses of historical and artistic value), which are considered out of scope, were excluded as well. On the contrary only properties for ordinary housing (that is, civil, economic, popular, ultra-popular, housing of a rural type, dwellings in cottages, corresponding to cadastral categories A2 to A7) were selected.

Finally, outliers defined according to dwelling area and rent per square meter were dropped out from calculation.

Having selected the statistical units from the Tax Office database, the cost of rents per square meter is obtained as the average price of each strata, defined according to dwelling size (surface area), geographical location of the dwelling (at NUTS 2 level) and the municipality type[17].

As for the case of food products, the estimates of the cost of rents per square meter are referred to year 2022.

4. Conclusions

The new sources of information that became available for the scope of the consumer price survey offered the opportunity to improve substantially the official indicators on absolute poverty by allowing more robust estimates of the poverty lines.

The methodological solutions that have been adopted in order to make the most efficient use of the information coming, on the one hand, from transaction data on

[16] The availability of the expiring date of the contracts allowed to estimate the stock of the existing ones in the reference year (2022). Moreover, a specific procedure was implemented in order to detect those contracts that (depending on the tax regime chosen by the owner) needed to be yearly updated and to revaluate accordingly the corresponding rents.

[17] Centre of metropolitan area, municipalities of metropolitan area suburbs and municipalities with more than 50,000 inhabitants and other municipalities. See Cutillo (2023) for more details.

food products and, on the other hand, from the administrative data on rents have been discussed in the previous sections.

As already noted, for the valorisation of the thresholds of the two sub-components, year 2022 has been considered as the reference year. It is worthwhile to emphasize that, according to the conclusions of the IISCAP, the estimates of minimum average prices will undergo a five-year revision, while, for years in between, the thresholds will be updated basing on the evolution of a specific set of sub-class indices[18] of the HICP.

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[18] Corresponding to the five-digits level of the ECOICOP classification.

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SOME EMPIRICAL EVIDENCE FROM THE USE OF SCANNER DATA TO ESTIMATE PRICES OF FOOD PRODUCTS INCLUDED IN THE ABSOLUTE POVERTY BASKET[1]

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Abstract. This work was developed within the activities of the Inter-Institutional Scientific Commission (IISC) established by ISTAT in order to review the methodology for estimating absolute poverty. The paper describes the main aspects of the new methodology used to estimate the prices of food products included in the absolute poverty basket, implemented thanks to the availability of scanner data, the new data source used by Istat for survey on consumer prices. The large availability of data allowed a selection of references (identified by barcodes/GTINs[2]) in order to calculate the annual minimum average prices of products necessary to satisfy the food needs of poor households. The paper shows some empirical evidences obtained from the analysis of scanner database. The causes of the high differences that emerged at a territorial level are also investigated.

1. Introduction

The Istat approach for measuring absolute poverty involves the identification of primary needs and the calculation of the cost of the basket of goods and services necessary to satisfy these needs (Istat, 2023c). Regarding the food component, the basket of products was identified through a nutritional model defined by Istat and sector experts. The monetary value of the absolute poverty basket is estimated on the basis of the prices acquired with the Istat survey on consumer prices (Istat, 2023b).

In 2009, in order to measure absolute poverty, Istat developed a methodology for calculating the household's "minimum acceptable expenditure"[3] (Istat, 2009). In 2023, Istat revised the methodology in order to take into account both changes in households' primary needs and the availability of new data sources to use. All the details on the revision of the main components of the absolute poverty basket are

[1] The work is the result of the overall contribution of the authors. However, Sections 1, 2 and 4 are attributable to Stefania Fatello, Section 3.1 is attributable to Cristina Dormi, Sections 3.2 and 3.3 are attributable to Carlo Matta and the appendix, related to the Information Technology architecture, is attributable to Francesco Altarocca.

[2] The Global Trade Item Number (GTIN) is a unique product identifier that is recognized internationally. If available, the GTIN code is indicated next to the barcode on product packaging.

[3] This is defined by the monetary value at current prices that constitutes the minimum amount of expenditure that the family must support in order not to find themselves in a condition of absolute poverty.

described in related papers published on the Special Issue of RIEDS "*New approaches for measuring poverty: studies and perspectives*".

This paper shows the results obtained using the new scanner data source relating to food products included in the absolute poverty basket. Section 2 describes the main aspects of the new methodology implemented using scanner data to estimate the annual minimum average price for the products considered. In Section 3 the results of the empirical analyses are shown. In particular, the main evidences relating two of the products included in the basket are highlighted, through the analysis of prices and quantities sold in the province of Rome and the comparison between the variability of minimum average prices at regional level. In the last section there are some concluding remarks. Finally, in the appendix some IT aspects related to the processing of big data are illustrated.

2. Main aspects of the new methodology

This section describes the main aspects of the new methodology implemented to valorize the poverty basket starting from the scanner data that Istat receives to estimate consumer price indices. To know in depth the details of the new methodology see Brunetti *et al.* (2024).

The methodological choices made were based on the analysis of the large database available. First of all, to estimate the minimum average price, a mapping was made which traces each food products included in the poverty basket to one or more products belonging in the consumer price basket. In total 61 food products, referring to packaged products, were associated with products that coming from monetary transaction data.

There are two important aspects of the new methodology implemented by looking at the empirical evidence on the data which shown in the following paragraphs: the first is represented by the selection of references, identified by barcodes/GTINs, to be included, while the second concerns the estimate of the minimum average prices for all food products considered at different levels of territorial aggregation.

2.1. The selection of references

For food products associated with scanner data collection it was necessary to identify the amount of GTINs sold for each product. Thus each product of poverty basket has been associated with the corresponding ECR[4] markets selected to

[4] ECR markets are the lowest level of the ECR classification (classification shared by industrial and distribution companies) and they have been linked to the aggregates of product of ECOICOP classification.

calculate consumer price indices and specifically connected to 171 markets of the ECR classification.

In this way all the GTINs relating to these markets are selected for subsequent analyses. After identifying the products to include in the poverty basket, it was essential to identify the references to consider. The choices made were supported by analyzes of the universe of GTINs available for each product in the year 2022. For example, regarding the product "Rice" all GTINs sold during the year in all available outlets were considered.

Scanner data provide prices and quantities of all the items actually purchased by household including all types of formats and packaging of the products. Therefore, for each selected market, it was possible to divide the products based on their characteristics and in particular by type of packaging and format.

Among these homogeneous subgroups of products, the ones most purchased by households were identified, based on annual data of quantities sold; a high turnover share for each group of products was included. Looking again at the product "Rice", the analysis show that the packages consisting of "1 pack, 1 kilogram" and "1 pack, 1/2 kilogram" represent 87% of the turnover in 2022. By selecting these two packages we were able to greatly simplify the processing without losing much information.

Obviously, to calculate the average prices of products with different packaging it was necessary to use a standardized unit of measurement for each different product.

Therefore, strata have been defined for each product considering: province, retail trade channel[5], combination of packaging type and most common format (example of stratum for rice is "*Rome, supermarket, 1 pack, 1 kilogram*") and GTINs were selected monthly within these strata. In fact, with scanner data it is possible to have data separated by retail trade channels: this enabled to evaluate the differences in sales prices between the different channels; the analysis of price distributions did not show evidence to exclude some retail trade channels. Furthermore, there is no information available on where the poorest households buy the products. So all retail trade channels were included in the calculations, not only Discounts.

In relation to each stratum thus defined, all GTINs sold in each month of 2022 were considered in order to study their price distribution. The aim was in fact to identify the GTINs that are presumably mostly purchased by the poorest households and therefore at relatively lower prices. Indeed, the new data source provides us with a large amount of data. This allowed us to make a selection of the GTINs sold taking into account the distribution of all prices paid for each product and selecting only the cheapest ones.

[5] For food product we have four retail trade channels: hypermarkets, supermarkets, discounts, small outlets with surface between 100 and 400 s.q.m.

Then the selection of GTINs, based on the price distribution in each stratum, occurs considering all GTINs belonging to the lower tail of the distribution (first quintile). The assumption underlying this choice is that having many GTINs available that satisfy the same food needs, the choice of the poorest households is oriented towards those with lower prices for the same quantity purchased.

Considering as an example the province of Rome, on which the analyses described below were carried out, the monthly average number of GTINs of all products included in the absolute poverty basket goes down from 10,064 available to 2,823 considered after the selection of the references. Similarly, if we consider the price quotations recorded for the same GTINs, the total number goes down from 465,114 available to 59,458 considered after the selection of the GTINs.

2.2. The process of estimating minimum average prices

As previously described, the methodology implemented involved a selection of GTINs based on the price distribution considering only the products belonging to the first quintile of the price distribution. This made it possible to estimate the minimum expenditure necessary to ensure the consumption of the recommended quantities of food products by households.

For each identified stratum, given by province, retail trade channels, packaging and format of the products, all the GTINs belonging to the first quintile of the price distribution were selected for each month of 2022. Then, for each stratum, the monthly average price was calculated as the weighted arithmetic average of the GTINs of the lower tail of the distribution, with weights proportional to the quantities sold. Formerly, for each stratum, the monthly minimum average price, calculated with the procedure just described, was reported to the specific unit of measurement.

The aggregation of the monthly minimum average prices then follows the steps described below for each food product:

1. the monthly minimum average price by province and retail trade channel is calculated as the weighted average of the monthly minimum average prices of the different combinations of packaging type and format. The weights are proportional to the quantities sold in terms of units of measurement;
2. the monthly minimum average price by province is obtained as the weighted arithmetic average of the monthly minimum prices of the retail trade channels. The weights are proportional to the importance of the channels in terms of provincial turnover[6];

[6] The provincial turnover is calculated as the sum of the turnover of all the GTINs sold in the outlets of a certain province.

3. the annual minimum average price by province is given by the simple arithmetic mean of the monthly minimum average prices;
4. the annual minimum average price by region is calculated as the weighted arithmetic average of the provincial average prices referred to point 3. The weights are proportional to the population resident in the provinces.

The greater availability of data at a more disaggregated territorial level allowed the use of data estimated at regional level without further territorial aggregations as in the past. The results of the processing showed important differences between the annual minimum average prices of each product in the different regions.

3. Analysis of the results: evidences on data

3.1. Analysis on prices and quantity sold

The objective of this section is to propose an exploratory analysis of the implications of the application of some criteria for the selection of references from the scanner database to be used for the calculation of minimum average prices, aimed at valorising the food basket of the poverty.

For the analysis, referring is made to two widely consumed products, rice and olive oil, focusing on the data relating to the province of Rome for the year 2022. Table 1 shows the composition by retail trade channels of the outlet sample for the province of Rome and for the entire national territory, relating to the year 2022 (Istat, 2023a).

Table 1 – *Number of outlets sampled by retail trade channels, Province of Rome and Italy - Year 2022.*

Retail trade channels	**Rome**	**Italy**
Hypermarkets	9	471
Supermarkets	57	1,453
Discounts	22	567
Small outlets (with surface between 100 and 400 s.m.)	26	1,000
Total sample	**114**	**3,491**

Source: Elaborations on scanner data

The selection of GTINs to include, computed at national level, is based first of all on the analysis of the most frequently purchased types of packaging. The aspects considered concern the characteristics of the package (single, multiple) and the quantity of product contained.

Table 2 shows the type of packaging that were selected for rice and olive oil: in particular, we consider the number of GTINs and the average price (respectively for kilogram and for liter). The last two columns of each table indicate, in decreasing order, the percentage of quantities sold and turnover relating to each packaging type. For each product there is only a subset of the different typologies of packaging type of all references sold. Most of them are not included in the table since the percentage of GTINs contained within is very small. The selected packaging types are highlighted in blue.

Table 2 – *Selection of packaging type for rice and olive oil, Italy - Year 2022.*

Rice						*Olive oil*					
Packaging type	N° GTINs	Average price per kilogram	% GTINs	% quantity	% turnover	Packaging type	N° GTINs	Average price per liter	% GTINs	% quantity	% turnover
1000GR 1 PACK	973	2,3	62,5	71,8	71,4	1000ML 1 PACK	805	4,8	34,4	76,5	71,1
500GR 1 PACK	324	2,1	20,8	17,1	15,6	750ML 1 PACK	765	5,6	32,7	17,0	18,7
2000GR 1 PACK	90	3,3	5,8	3,5	4,9	500ML 1 PACK	429	4,8	18,4	2,9	2,7
250GR 1 PACK	31	1,7	2,0	2,8	2,0	3000ML 1 PACK	111	13,9	4,7	1,0	2,7
800GR 1 PACK	13	2,3	0,8	1,5	1,5	250ML 1 PACK	91	3,2	3,9	0,7	0,5
850GR 1 PACK	17	2,3	1,1	1,1	1,1	5000ML 1 PACK	62	24,0	2,7	0,7	3,3
5000GR 1 PACK	62	5,5	4,0	0,9	2,1	450ML 1 PACK	1	3,9	0,0	0,4	0,3

Source: Elaborations on scanner data

Note that also the number of units in the package are specify because for some products included in the poverty basket like eggs, tuna, yogurt many GTINs are sold in multiple packages. For rice there are two main packaging type (single 1000 gr and single 500 gr), that have a coverage in terms of turnover of about 87% (about 89% in terms of quantity sold). Regarding olive oil the selected packaging types are two (single 1000 ml and single 750 ml), and the percentage of coverage is about 90% in terms of turnover and 93.5% in terms of quantity sold.

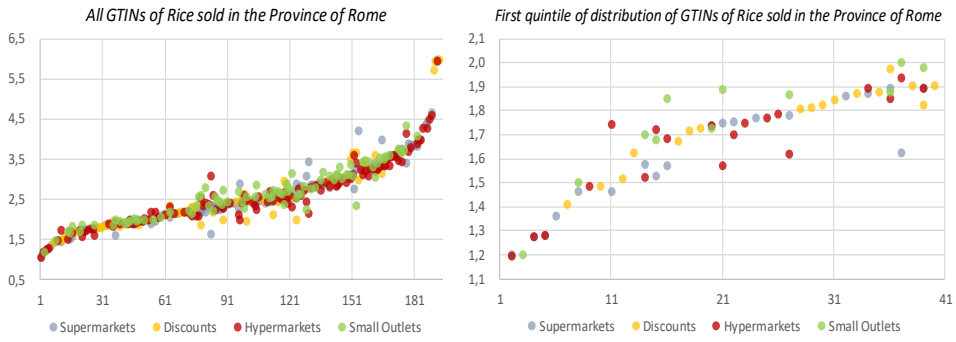
After identifying the types of packaging to include, some analysis were carried out on the distribution of prices and quantities sold. Figures 1 and 2 show, respectively, the distribution of the annual average price of rice and of olive oil relatively to all GTINs sold (on the left side) and to GTINs belonging to the first quintile of distribution (on the right side). The different colors indicate the types of retail channel where they are sold.

In general, it is customary think that Discounts could be the type of retail channel that has the lowest prices compared to other channels but this evidence does not emerge from the analysis on scanner data. In fact, from the figures it is clear that GTINs that occupy the lower positions in the ranking do not belong exclusively to the Discounts but to all type of retail channel. Furthermore, looking the distribution of the prices of GTINs selected into the first quintile (graphs on the right in Figure 1 and Figure 2), we can see that they belonging to all type of retail channel;

furthermore, GTINs prices appear very close to each other for olive oil while for rice they have an increasing trend.

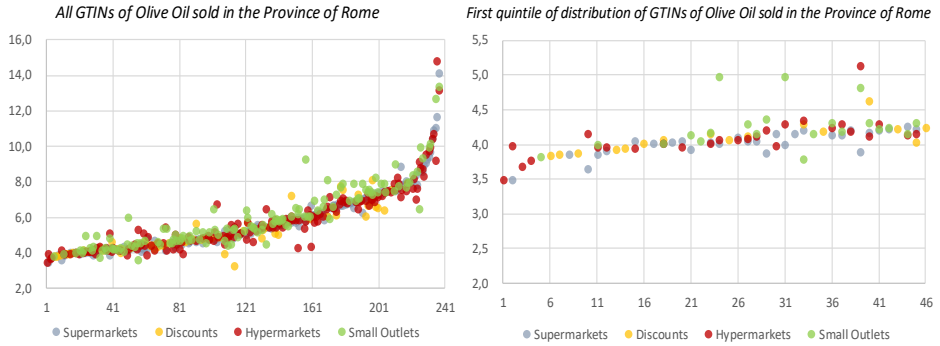
In particular, the first quintile of GTINs of rice are sold more by Hypermarkets (20 out of 40 GTINs) and Supermarkets (20/40) respect to the Small outlets (17/40) and Discounts (11/40). The same scenario looms for the first quintile of GTINs of olive oil: the chains where there are more products sold, referring to the lowest prices of distribution, are Supermarkets (32 out of 48 GTINs) and Hypermarkets (27/48) while there are fewer GTINs in the Small Outlets (22/48) and Discounts (16/48).

Figure 1 – *Distribution of the annual average prices of Rice by retail channels - Year 2022.*



Source: Elaborations on scanner data

Figure 2 – *Distribution of the annual average prices of Olive oil by retail channels - Year 2022.*

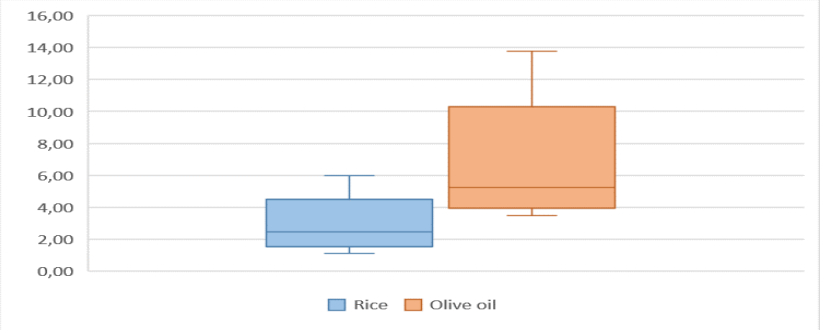


Source: Elaborations on scanner data

Figure 3 shows the boxplot of the two products considered for the analysis: this graph helps to describe the characteristics of a distribution and to identify the presence of asymmetry and outliers. The average annual prices of the 193 GTINs

selected for the rice, in ascending order point out a minimum value equal to 1.09 and a maximum equal to 5.99. The median is equal to 2.45 and it shows that the distribution of the minimum average prices is slightly asymmetrical to the left (positive asymmetry of the distribution). This means that the mean of the distribution of the minimum average prices (equal to 2.60) is higher than the median and the values are grouped in the low values part, with a long tail towards the higher values.

Figure 3 – *Boxplot of the annual average prices of Rice (single, 1000 gr) and Olive oil (single, 1000 ml) in the province of Rome - Year 2022.*

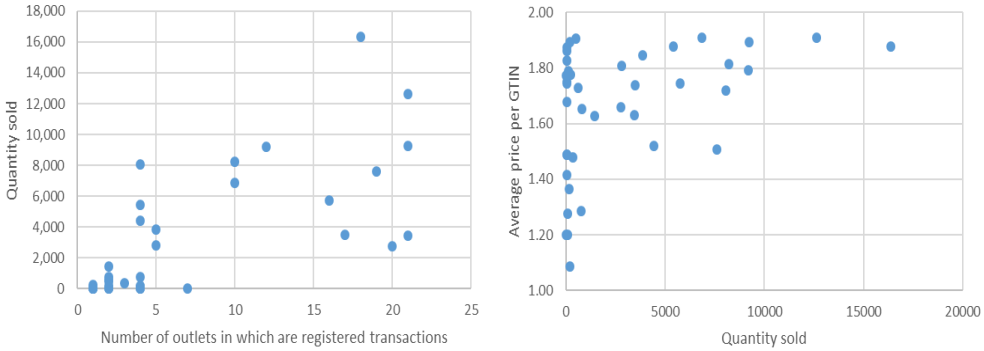


Source: Elaborations on scanner data

Regarding olive oil, the distribution of the average annual prices of the 237 considered GTINs have the same situation: the range goes from 3.49 to 13.77 and the median that is equal to 5.24 is below the mean (5.69). In fact, as the graph shows, the median is closer to the lower quartile Q1 than to the upper quartile Q3.

Figure 4 and 5 show the results of the analysis carried out considering the quantities sold for each GTINs and relating them to the number of outlet in which they are sold and the relative average prices. GTINs considered in these analyses belong to the first quintile of the distribution prices.

Figure 4 – *Quantity sold, number of outlets and average price per GTIN for Rice (single, 1000 gr) in the Province of Rome, first quintile of distribution - Year 2022.*

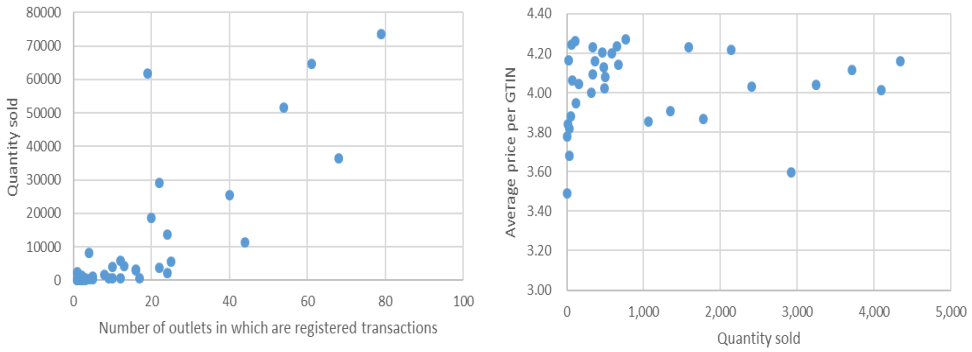


Source: Elaborations on scanner data

Considering GTINs of rice, the variability of the quantities (number of packages) sold during the year is very large: the minimum value is equal to 1, the maximum is equal to 16,357 and the average is equal to 2,907.

Looking at the distribution of the olive oil, the variability range widens even further with a minimum value of 1, a maximum of 73,659 and an average equal to 9,186. Furthermore, Figure 4 and 5 highlight that there is a certain level correlation between quantities sold of the single GTIN and the number of outlets in which sales were recorded (more in the case of olive oil respect to rice). Looking at the number of outlets in which are sold the GTINs of the first quintile of the distribution, on average, references are sold in 6.7 outlets for rice and in 14.2 outlets for olive oil.

Figure 5 - *Quantity sold, number of outlets and average price per GTIN for Olive oil (single, 1000 ml) in the Province of Rome - Year 2022.*



Source: Elaborations on scanner data

Finally, concerning the GTINs of the first quintile, there is not a clear correlation between average prices for GTIN and quantities sold. Regarding the trend of quantity sold respect to the average price per GTIN, considering rice we note that sales values are more variable in terms of price levels than in the case of olive oil.

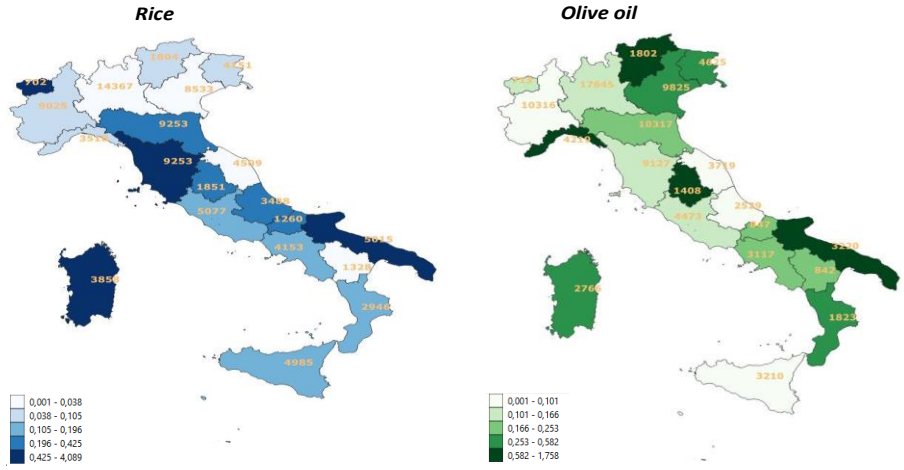
At the same time, quantity sold are relatively low for GTINs whose average prices are at the extreme ends of the range examined. Although, in few cases for both products, we find some GTINs with high prices that have rather high quantities sold.

3.2. Analysis of the variability of the annual average prices: a regional comparison

This subsection describes the results of the variability analysis of the annual average prices by making a regional comparison.

Figure 6 shows the territorial distribution of price variability among the Italian regions: the differences between the coefficients of variation (CV) of prices at territorial level are evident in the maps. The graphs also show the number of quotations used for the calculation of the minimum average price in each region for the two products considered. Note that the coefficient of variation express by how much the regional minimum average price considered varies compared to the national minimum average price.

Figure 6 – *Distribution of the coefficient of variation of prices and number of quotations used for Rice (single, 1000 gr) and Olive oil (single, 1000 ml) - Year 2022.*



Source: Elaborations on scanner data

From the figure we notice that some regions show a high level of variability respect to the minimum average prices: for the rice (map on the left) Valle d'Aosta, Toscana, Puglia and Sardegna show high values of the variation coefficient respect to the national minimum average prices.

In particular, Valle d'Aosta and Sardegna have a higher value of CV associated to higher prices respect to the Italian figure while Toscana and Puglia have them lower. This means that a high CV can be related to a higher or a lower level of regional minimum average price.

Regarding olive oil (map on the right), the regions with high values of CV are Liguria, Trentino Alto Adige, Umbria and Puglia. Specifically, Trentino Alto Adige and Liguria have higher prices while Umbria and Puglia have them lower.

The number of quotations highlighted in Figure 6 do not show a particular relationship with the CV values in the different Italian regions. A deeper analysis of the number of quotations recorded for the different retail chains could produce more evidences regarding this aspect.

The differences across regions from the CV point of view could be due to two different situations: one relating to the assortment present on the shelves of the outlets and the other relating to the number of quotations available. The analysis of the variability related to all the products within the poverty basket shows that higher values of CV are not directly related to lower values of number of quotations.

The question relating to the assortment of products in the outlets and therefore the variety of products offered by a specific chain derives from a differentiation in distribution and localization in the territory. At the same time, the number of quotations actually present for a given outlets can also influence the level of the regional minimum average price (in particular, if we consider the different retail trade channels). This is evident, especially comparing two regions, within which there is a different composition in terms of types of outlet. The strong presence of some types of retail trade channels with products at lower prices and/or on offer can significantly influence the level of the regional minimum average price.

3.3. A case study: focus on products with high variability

Looking at the variability of the minimum average prices of the different group of products, we can focus on the territorial distribution of the coefficient of variation (CV). In the Table 3, there are the products within the poverty basket with higher CV: these products show more volatile prices for some regions. The selection was made by considering the products that point out a regional CV higher than the Italian CV for a certain number of regions.

Table 3 – *Distribution of the coefficient of variation of some selected products for the Italian regions (with minimum value, mean and maximum) - Year 2022.*

Product	Measure unit	Piemonte	Valle d'Aosta	Lombardia	Trentino-Alto Adige	Veneto	Friuli-Venezia Giulia	Liguria	Emilia-Romagna	Toscana	Umbria	Marche	Lazio	Abruzzo	Molise	Campania	Puglia	Basilicata	Calabria	Sicilia	Sardegna	Min	Mean	Max
COOKED HAM	KG	3.06	21.65	8.60	24.99	8.79	3.29	2.82	0.59	5.91	2.61	0.33	2.60	3.78	2.58	6.15	3.87	9.37	4.83	4.28	15.71	0.33	6.79	24.99
RAW HAM	KG	3.00	75.26	7.10	2.44	5.37	0.33	6.52	3.14	0.07	2.49	1.53	0.85	0.60	0.02	24.82	0.35	33.01	24.02	12.15	10.95	0.02	10.70	75.26
CHOCOLATE	KG	1.55	12.51	0.49	0.47	9.10	13.14	1.46	1.68	13.83	0.27	5.17	1.18	0.88	1.33	1.81	2.81	4.45	13.85	0.80	1.25	0.27	4.40	13.85
DRIED FRUIT	KG	0.03	76.73	0.58	8.02	0.47	1.33	20.01	7.01	0.80	1.20	0.21	4.19	4.21	22.75	3.20	14.49	24.50	6.36	5.68	0.07	0.03	10.09	76.73
DEPARTURE CHILD MILK	LT	1.24	11.47	1.78	10.58	4.75	6.17	5.89	0.33	2.45	0.25	5.46	0.71	6.97	5.69	0.02	3.64	54.13	1.48	96.64	35.11	0.02	12.74	96.64
FROZEN FISH	KG	1.47	43.55	0.11	0.96	2.70	5.36	3.64	0.26	0.01	0.58	0.19	0.03	0.27	0.36	5.34	14.44	12.10	0.11	19.21	0.50	0.01	5.56	43.55
SALMON	KG	0.15	72.25	0.96	0.98	28.71	24.79	0.69	7.93	1.88	0.43	1.42	0.32	3.73	2.20	0.08	0.04	1.95	1.78	0.35	18.03	0.04	8.43	72.25

Source: Elaborations on scanner data

In particular, the regions that have the highest values of the coefficients of variation are Valle d'Aosta, Trentino Alto Adige, Friuli Venezia Giulia, Abruzzo, Puglia, Sicilia and Sardegna.

Specifically, a detailed analysis of the trend of the "*Departure child milk*" product was conducted in order to understand the dynamics of the average prices[7] based on the quantities sold by every GTIN in the regions considered. Table 4 shows, for the regions that assumes the highest values of coefficient of variation for this product, the selection of the main GTINs sold in the different geographical areas.

Table 4 – *Average price* and quantity sold for the GTINs of product "Departure child milk" in 4 Italian regions - Year 2022.*

Product	Trentino Alto Adige		Veneto		Abruzzo		Sicilia	
	Average price	Quantity sold	Average price	Quantity sold	Average price	Quantity sold	Average price	Quantity sold
GTIN 1					5,78	21		
GTIN 2					6,11	29		
GTIN 3	5,09	974	4,84	5.182	5,25	155	5,89	412
GTIN 4					5,57	464		
GTIN 5	5,78	444	5,34	9.616	5,38	220	6,50	6
GTIN 6			4,61	357	5,44	1.024		
GTIN 7	**6,62**	**8.523**	**6,67**	**63.089**	**7,31**	**6.437**	7,61	217
GTIN 8			5,38	285	5,71	709	6,07	10
GTIN 9			3,32	592	3,11	802	**3,25**	**17.000**
Total		9.941		79.121		9.859		17.645

Source: Elaborations on scanner data

** The average prices are referred to the quantity sold of 1000ml.*

[7] The average prices of the different products was brought back to the quantity sold of 1000ml since the GTINs have different formats with different quantities inside.

Looking at the composition of the "*Departure child milk*" in terms of GTINs we can see how in each region there is a prevalence of sales of just one product: indeed the GTIN 7 is the best seller for 3 of the 4 regions observed (Trentino Alto Adige, Veneto and Abruzzo) despite having the highest minimum average price in all three.

Sicilia has a different most selled product (GTIN 9) which is, at the same time, a product with a very low minimum average price (3.25 euro for 1000ml); this also significantly decreases the average regional minimum price. This situation is due, on the one hand, to a different behaviour of consumers towards the purchase of the GTINs in question and, on the other, to the different assortment within the outlets in the different regions.

The evidence shows that the variety of GTINs offered for some products is not homogeneous across the national territory. The offer of retail distribution chains between the Italian regions is also quite different and this affects the minimum average prices.

Since the product "*Departure child milk*" is composed by a relatively small number of GTINs inside, the analysis was made also for other products of the poverty basket with an amount of GTINs that are greater than the previous observed. In particular, regarding the product "*Cooked ham*" there is a greater assortment of products sold in the regions considered. Table 5 shows only the first 12 GTINs in terms of quantity sold not all the product sold.

Table 5 – *Average price* and quantity sold for GTINs within the product "Cooked Ham" in 4 Italian regions - Year 2022.*

	Trentino Alto Adige		**Toscana**		**Calabria**		**Sardegna**	
Product	**Average price**	**Quantity sold**	**Average price**	**Quantity sold**	**Average price**	**Quantity sold**	**Average price**	**Quantity sold**
GTIN 1	16,22	24.958	13,63	179.242				
GTIN 2	13,31	121.468	**13,53**	**2.045.273**	**13,66**	**313.236**	**13,55**	**510.892**
GTIN 3	**18,53**	**167.211**	17,34	792.602	18,31	42.163	24,94	1.738
GTIN 4	18,73	106.653	14,51	1.406.422	19,46	32.204	20,85	40.843
GTIN 5	12,56	26.215	12,55	15.473	12,56	48.000	12,58	100.322
GTIN 6	7,55	37.245	6,95	1.478	7,89	37.185	7,20	97.674
GTIN 7	10,99	62.263	10,92	14.033	11,07	96.515	11,01	174.450
GTIN 8			10,89	98.919	10,26	65.089		
GTIN 9			8,26	674.220			10,60	4.396
GTIN 10			9,42	537.374	9,51	24.823		
GTIN 11	11,91	39.054	10,33	16.366	12,06	134.902	11,59	232.599
GTIN 12	15,10	1.894	14,42	15.528	12,06	25.553		
Total		586.961		5.796.928		819.670		1.162.914

Source: Elaborations on scanner data

** The average prices are referred to the quantity sold of 1000gr*

The GTIN 2 is the best seller in three of four considered regions, Toscana, Calabria and Sardegna with very similar prices each other, whereas GTIN 3 is the best seller in Trentino with an higher price than GTIN 2. The evidence again shows that the minimum average price is influenced by the different variety of GTINs purchased by households and/or offered by retail chains.

4. Concluding remarks

This paper shows some empirical evidence on the basis of which the new methodology was implemented to valorise the absolute poverty basket using scanner data. First of all, thanks to such a rich data source, it was possible to associate each food product with a very high number of GTINs sold characterized by very heterogeneous packaging (both in terms of quantity and number of pieces included in the package). This allowed us to make a selection to identify the packaging most purchased by households.

Second, the distribution of prices for individual products highlighted that the GTINs with lower prices are not concentrated in specific type of retail channel but are present in all the types of outlets. Therefore no type of retail channel can be excluded a priori. Third, thanks to the high number of GTINs sold for each product it was possible to select those belonging to the first quintile of the price distribution. In fact, it is assumed that poorer households can satisfy their food needs by purchasing GTINs with lower prices.

Finally, for each product, it was possible to calculate the annual minimum average prices at more disaggregated territorial level and the results show a high variability of prices at regional level. A detailed analysis of some products with high coefficients of variation between regions has shown that this variability is explained, not only by different pricing policies, but above all by the different assortment of products sold. This is also due to the different distribution of large-scale retail trade chains across Italy. Therefore the difference between the GTINs most purchased by consumers significantly influences the minimum average prices estimated at territorial level.

Further analyzes on scanner data may be carried out in the future to investigate the price distribution of food products. In the analysis carried out so far, we have chosen to study the distribution of prices relating to the packaging most purchased by consumers. A possible development is the study of the scales of savings that can be achieved by increasing the contents of the packages. These are the least sold GTINs but they could be those purchased by larger poor households to save money.

Appendix: Information technology architecture, methodologies and paradigms

In this appendix, the main features of the technological infrastructure will be presented as well as the important aspects that had led to choices regarding technologies, paradigms and implementation. Because of the growth of retail data, it was necessary to abandon RDBMS[8] systems and adopt a big data platform solution. In fact, RDBMS systems had begun to show some critical issues such as the difficulty of scaling over a larger amount of data, the inability to easily store and process multiple annuals of the same survey, the increasing time for processing data.

The big data management platform, combined with modern data management techniques, overcome most of the problems mentioned above. In particular, the use of a data-lake built on HDFS (Apache Hadoop Distributed File System) has enabled the efficient processing of more than 700 million records per year for the poverty analysis and 1.3 billion records per year for the consumer price survey.

Specifically, data of the consumer price survey are weekly acquired through a centralized supply system ARCAM[9] and then are ingested into the data-lake. Thus, the data used for the valorisation of poverty basket were already available in our systems. It was sufficient to define a logical link between the data contained in the CSVs[10] files and the logical data model whereas the technical details and parallelism were handled directly by the platform engines.

From a technical point of view, thanks to the design and implementation of the new scanner data information system, including data structures, procedures and pipelines, the effort to deal with new challenges in new research activities and scenarios are significantly reduced.

Most of the modules of the production system were implemented in Scala programming language and using Spark framework. That permits us, out of the box, to take advantage of the distributed processing with high levels of performance and shorter production time. In addition, since Scala is a strongly typed language, it made the system extremely robust and less prone to errors.

The architecture of the application was realized by dividing it into modules: each module implements a defined part of the process. The guiding principles that inspired the design of the architecture are separation of responsibilities, maximum cohesion and minimum coupling of functionalities, as well as abstraction in design to make the modules more extensible and reusable (Gamma *et al.*, 1994), (Fowler *et al.*, 2002).

[8] Relational DataBase Management System.
[9] ARCAM is the portal for securely acquiring administrative archives from public and private organizations.
[10] The supplier stores the data in simple comma separated values (CSV) files whose structure is defined by the following fields: week and year, product id, outlet id, quantity of the product sold and related turnover.

Starting from the elementary data in the data repository dedicated to the production of consumer price indices, many packages, procedures and workflows are reused without major changes. The creation of the new environment was straightforward thanks to the abilities of big data management systems to define data structures regardless of the underlying data format, partitions and locations.

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AN EVALUATION OF THE NEW ISTAT MEASURES OF ABSOLUTE POVERTY AND POSSIBLE DEVELOPMENTS OF DEFINITIONS, METHODS AND INDICATORS

Luigi Biggeri

Abstract. In October 2023, Istat (Italian National Institute of Statistics) published new measures of absolute poverty for the years 2022 and 2021. The objective of this paper is twofold. First, to evaluate merits and potential drawbacks of the new measures. Second, to present my vision on the developments of definitions, methods and indicators of poverty as a whole, taking into account all its manifestations and facets. The final suggestion is to implement a poverty data ecosystem in order to produce consistent public statistical information on all aspects of the phenomenon, essential for designing, implementing and monitoring adequate policies for poverty reduction at national and local level.

1. Introduction

The Istat (Italian National Institute of Statistics) is one of the few National Statistical Institutes that has been publishing estimates of Absolute Poverty or several decades (see Menyhért *et al.*, 2021; Istat, 2009). These estimates are very useful for understanding how poverty is widespread: which types of families and individuals it affects, with what intensity it strikes, and where, in which territories, it manifests within the country. This is indispensable statistical information for designing, implementing, and adequately monitoring policies to combat poverty (Bishop *et al.*, 2017; Biggeri and Pratesi, 2017), although there is no evidence that they have ever been used in Italy as a basis for designing measures.

Since 1996-97, Istat has been concerned with developing a methodology for estimating absolute poverty (Istat, 2009; Chelli, 2023; Saraceno, 2023). In 2003, Istat[1] established a Study Commission, composed of researchers from Istat and external experts, tasked with reviewing and modifying the previous approach to measuring poverty. Their work led to the publication of time series of estimates of absolute poverty starting from 2005, following the methodology extensively explained and justified in the aforementioned Istat (2009) volume.

The definition and measurement of absolute poverty adopted were anchored to the identification of a minimum basket of goods and services to satisfy a "minimum"

[1] During my presidency of the Institute.

acceptable standard of living, sufficient to avoid severe forms of social exclusion. In general terms, the monetary valuation of the basket was carried out at the minimum prices accessible to families and individuals, considering the existing distribution channels in the various territorial zones of the country.

Minimum basket of needs should take into account changes over time and space in the economic, social, and environmental evolution cycle of population groups and society as a whole, as well as the classifications, definitions, and methods adopted in the collection of information to be used in estimating absolute poverty (Ravallion, 2016; Biggeri, 2022).

For these reasons, in December 2021, the then-president of Istat, Prof. Gian Carlo Blangiardo, appointed a new Inter-Institutional Scientific Commission tasked with proposing an adequate update and thorough review, rather than a substantial modification of the methodological framework (Chelli, 2023).

At the conclusion of the Commission's work, Istat published new measures of absolute poverty for 2022 and 2021 in October 2023 (Istat, 2023), and in November of the same year, Istat organized a Conference on "Absolute Poverty. Revision of the current methodology and perspectives on measuring the phenomenon", from which this paper draws inspiration.

As it is evident from the title of the paper, the objective is twofold. Firstly, to evaluate the innovations, merits, and any limitations of the new measure that should be sought to reduce. Secondly, to present detailed proposals for possible developments of definitions, methods, and indicators of poverty as a whole, taking into account all its manifestations and facets. The final suggestion is to implement a poverty data ecosystem in order to produce consistent public statistical information on all aspects of the phenomenon, essential for designing, implementing and monitoring adequate policies for poverty reduction at national and local level.

Therefore, the paper is organized into two parts. The first consists of two sections. Section 2 presents the most important innovations and the main merits of the new measures of absolute poverty. Section 3 is dedicated to exploring the possible limitations in the construction of the measure that it is advisable to discuss and potentially seek to reduce. The second part dedicated to the possible future developments of the poverty measure consists of four sections. Section 4 recalls the many characteristics and manifestations of poverty and the various approaches to the definition and measurement of absolute poverty. Section 5 indicates some of the problems and measurement methods that must be addressed if one wants to broaden the concept and measurement of absolute poverty. Section 6 briefly recalls the many available data on poverty and their reliability and validity for producing official statistics on the phenomenon. Finally, Section 7 concludes the paper by proposing the implementation of a Poverty Data Ecosystem specifically to achieve the goal of being able to produce all the necessary information.

2. The most important innovations and the main merits of the new measures of absolute poverty

The Inter-Institutional Commission, appointed in December 2021, began meetings in January 2022 with continued assistance for processing and experiments by Istat's researchers.

Let me applaud the Istat's researchers for the enormous work carried out with high competence and efficiency and in good time having published the data on absolute poverty in the month of October 2023.

The innovations introduced to the methodology and calculation of absolute poverty have been numerous, as highlighted in the Report of October 25, 2023 (Istat, 2023), in the many working documents presented in the Commission, and in the concise reports presented at the Conference on November 7, 2023 (https://www.istat.it/it/archivio/289274). I will outline the main ones here, referring to the aforementioned documents.

(a) The introduction of the new COICOP classification, the updated estimates from census data, and the new survey on household expenditure in 2022.

These innovations have allowed for the updating of reference frameworks and improved estimation of absolute poverty.

The COICOP 2018[2] has classified the set of goods and services purchased by households for consumption purposes, taking into account transformations from both the demand and supply sides, with better alignment with modern consumption patterns. Furthermore, this new classification was adopted in the 2022 household expenditure survey (usually called HBS), for which the size of the planned theoretical sample was also increased (from about 25,000 to 32,500 families).

The results of the Permanent Population and Housing Census obtained in the Autumn 2021 have provided updated information at the municipal level on the population by age and the characteristics of households, enabling the definition of 50 distinct household typologies, according to the size of the household and the age of its components (now, the age classes are 7 instead of 6, having divided the age group 18-59 into classes 18-19 and 30-59).

[2] COICOP refers to the Classification of Individual Consumption According to Purpose adopted by the United Nations Statistical Commission. COICOP 2018 replaced the 1999 classification.

(b) The evaluation of the Absolute Poverty Thresholds (APTs) at regional level and for typology of municipality.

It is certainly the most significant innovation considering that all poverty scholars argue that, in order to carry out targeted interventions, poverty should be assessed at the local level, that is, in the local territorial areas where families live.

Since 2005 Istat has been estimating absolute poverty and absolute poverty thresholds by three geographical macro-areas (Nord, Center and South) and within them by three types of municipality. In the new measure introduced in 2023 the number of the geographical areas improved a lot because the estimations have been done for all the 20 Italian Regions.

(c) Innovations in the evaluation of the food component.

The main innovations introduced in the food component of the absolute poverty measure are the following:

- the daily needs are updated based on the new recommended intake levels of nutrients updated at 2018 and evaluated by the CREA Research Centers, Food and Nutrition;
- the number of foods considered is 96 for 12 food groups (in 2005 estimates they were 34);
- the monetary value is calculated on the basis of an average price obtained as a weighted arithmetic mean of the minimum prices charged in the various types of distribution channels at provincial and regional level (now, the database used is truly very broad). That is the minimum price accessible to all households, taking into account the actual characteristics of the offer in the different territorial realities.

(d) Innovations for the evaluation of the housing component.

The housing component consists of four elements: (i) rent, (ii) heating including gas for cooking and water heating, (iii) electricity, and (iv) durable household goods. Various changes have been made to the methods for their assessment However, the most significant innovation concerns the use of the real estate rental database from the Real Estate Market Observatory of the Revenue Agency, which has allowed for significant disaggregation by region, type of municipality, and housing surface class.

(e) Analysis of the effects due to changes in the data used and calculation methodologies.

Many impact analyses of the changes made have been conducted. In particular, evaluations of energy social bonuses and the use of the rental database instead of data from the sample survey on household expenses for assessing rents must be noted.

3. Some limitations of the measures: discussion and possible interventions

In this paragraph, I would like to present some possible limitations of the new absolute poverty measures with the aim of discussing them, verifying their actual consistency, and proposing possible interventions to reduce or eliminate them.

(a) The hypothesis of national homogeneity in the basket of products and services.

Even if the hypothesis is applied for each type of household - defined by the number of members and their age group, it is somewhat strong and difficult to fully accept. In fact, primary needs, and the goods and services that satisfy them, are not homogeneous across the national territory, but vary over time and space and can be satisfied differently over time and space. The food products considered are 96 and, therefore, quite numerous, with each food item being linked to one or more products considered in the consumer price survey.

However, the issue is that the principle of "Like-to-Like" is generally accepted, meaning that the products to be considered are assumed to be the same across the different territorial areas of the country, and only in some cases consumer preferences are taken into account[3].

I believe it would be appropriate to indicate the "Product Group" of the ECOICOP-8-digit classification to which each food item belongs, and then in each territorial area, within the product group, choose the product or products most purchased by consumers belonging to the first decile, or better ventile, of their distribution based on total consumption expenditure.

(b) The hypothesis that family resources are equally shared among all members.

The hypothesis that poverty affects all individuals in a poor household in the same way is certainly not always valid. In reality, there may be non-poor individuals even if they live in a poor household and individuals in poverty even in non-poor

[3] In the "Like-to-Like" approach there is a high risk that not all the products are available in all territorial areas within a country.

households. Typical cases include: (i) different situations of women and men within a household (ii) the case of children in educational poverty even if they live in a non-poor household. However, for the current measure of absolute poverty, I believe it is advisable to maintain the aforementioned hypothesis.

(c) Monetary evaluation of products and services included in the "Absolute Poverty Basket" and purchasing behaviors of the poor.

The evaluation of food products is carried out in great detail, referring, in most cases, to the minimum prices of the products purchased, across different distribution channels, by the first quintile of consumer distribution per expenditure class.

Actually, that is the minimum price accessible to all households, taking into account the characteristics of the offer in the different territorial realities. These are not necessarily the prices paid by absolute poor households.

In fact, the consumption behaviour of poor households varies for quality of the commodities, channel of distribution, location of the markets, and, above all, the prices paid. To improve the adequacy of the minimum prices paid by the poor it is necessary to know the consumption behaviour of poor households at territorial level and their behavior in order to choose the cheaper products, in other words we should individuate the markets of the poor. A first tentative survey and analysis has been conducted by Istat in 2018 (Biggeri and Pratesi, 2022).

Further research is needed possibly by leveraging the larger sample size of the household expenditure survey and by using Small Area Estimation (SAE) methods.

(d) The estimated of Absolute Poverty Thresholds (APTs) at the territorial level.

In fact, by construction, they are calculated separately for each of the three types of municipality (Center municipalities of a metropolitan area; Suburb municipalities of a metropolitan area and municipalities with 50,001 inhabitants and above; Other municipalities up to 50,000 inhabitants). However, only eleven regions host "Center-municipalities of a metropolitan area". "Suburb municipalities of a metropolitan area and municipalities with 50,001 inhabitants and above" are present in eighteen regions (Regions Valle d'Aosta and Molise are missing because they do not have municipalities with more than 50,001 inhabitants and above); while "Other Municipalities up to 50,000 inhabitants" are present in all the 20 Italian regions. In my opinion, it is difficult to compare and interpret the APTs among the various regions because of the heterogeneity between the suburb areas of the metropolitan areas and the municipality with more than 50,000 inhabitants and the weight in terms of population that these two types of municipalites have in each region.

Therefore, it is first necessary to test extensively the homogeneity of the level of prices in the two different types of areas, and, second, it could be better and useful

to calculate the APTs separately for the areas of suburb municipalities of a metropolitan area and for the municipalities with 50,001 inhabitants and above.

(e) The method of calculating the residual component.

This macro component of the absolute poverty basket has been considered a weak point in the estimates of absolute poverty made by Istat since 2005 (Istat, 2009). In the new estimates the content of residual component has been better defined and some expense items have been evaluated separately. However, the quantities of individual goods and services that are included in the residual component have not been defined because it was not possible, in this context, to refer to specific regulations or scientific standards', as done for food and housing components. To assign a monetary value to this component, it was hypothesized that it would be influenced by family composition in a similar way to the food component. The value was, therefore, assigned based on the observed association between residual expenditure (as a whole) and food expenditure, estimating the coefficients through a regression model applied at the regional level, also taking into account the number of family members by age group.

However, the above mentioned hypothesis is not always justified. Therefore, since the residual component has a significant impact on overall spending (ranging between 20% and 25%), it is certainly appropriate to try to separately evaluate some relevant types of expenses, such as those for clothing and footwear, which cannot be correctly evaluated with the use of the mentioned regression model as they have no relation to food expenses.

(f) Evaluation of the reliability of absolute poverty estimates.

The problem is not currently explained in sufficient detail in Istat report (Istat, 2023), which does not mention that some estimates for detailed aggregates have rather high errors. These aspects will certainly be explored in depth in the volume on absolute poverty, in which Istat will present in detail both the new methodology and the main results.

4. Characteristics and manifestations of poverty: definitions, measures and theoretical approaches

In this second part of the paper, the aim is to propose possible developments of definition, measurement methods, and indicators of poverty as a whole, taking into account all its manifestations and facets.

During the Commission meetings, everyone agreed that in the future we must surpass the solely economic measure of absolute poverty. It is essential to incorporate non-economic poverty indicators and consider not only absolute poverty but also its various types (dimensions), introducing other components of well-being and/or ill-being. Some researchers are very critical of the available measures that predominantly emphasize material and monetary poverty (Amadi and Igwe, 2015). To this end, it is necessary to examine what types of poverty exist, how and where they manifest, and then develop two lines of consideration stemming from the following questions: (i) Is it possible to broaden the assessment of absolute poverty to other dimensions besides the purely economic one used thus far? And for these new dimensions, is it possible to identify a threshold below which individuals or families are considered in absolute poverty for that dimension? (ii) Is it feasible to develop a data and indicator system for all types of poverty?

It is important to bear in mind that poverty is a complex, multifaceted and multidimensional phenomenon, and its definition and measurement change depending on the dimensions considered. Identifying the phenomenon is, therefore, challenging because it is often latent, meaning it does not have readily observable manifestations that immediately provide full evidence of the phenomenon.

However, it is clear that there are many forms of poverty, and their definitions and measurements - which imply value judgments - have advantages and limitations, to the extent that their use often depends on the context and specific objectives of the anti-poverty policies one aims to implement.

Essentially, it can be said that there are many forms of poverty concerning various economic, social, environmental, etc., dimensions that are taken into account. It is a complex puzzle composed of many pieces that are often not disjoined.

Without claiming to be exhaustive, let us look at the main definitions and measures.

(a) Economic and non-economic poverty

Economic poverty refers to a situation where an individual or a family's income and asset availability (both real and financial) is insufficient to meet the needs for goods and services considered essential for maintaining a decent standard of living or deemed adequate in terms of food, housing, clothing, communication, transportation, education, and healthcare. This inadequacy often leads to significant deprivations.

However, poverty is not determined only by economic resources. Regardless of income levels, individuals or families may experience significant hardship due to lack of access to vital services such as education, healthcare, job markets, transportation, etc., or due to their inability to participate in social and political life.

These issues affect all members of family or only specific groups within it (such as the disabled and poor children, or worse, those facing educational poverty).

Moreover, in a society, inequalities are not limited to the distribution of material resources but also extend to human and social capital, health, etc. Poverty, therefore, encompasses emotional, mental, and spiritual states as well, representing both extreme unhappiness and a condition of moral narrowness and pettiness, aspects that are impossible to measure.

(b) Absolute and relative poverty

Absolute poverty is identified by the value of a minimum basket of goods and services necessary to satisfy a set of needs considered essential within the social context of reference. Relative poverty is identified in relation to a standard (average or median) relative to the reference population.

These two types of poverty can be assessed both in terms of income and consumption expenditure.

(i) Absolute economic poverty

It is typically assessed as the minimum consumption expenditure of essential goods and services, referring to the standard of living, while taking into account the actual ability of individuals and families to purchase such goods and services. The assessment depends on the basket of goods and services considered.

It follows that a person or a family may not be able to afford one or more components of the basket, leading to what is known as food poverty, housing poverty, clothing poverty, and so on (in addition to food poverty, we also talk about malnutrition and food insecurity).

Of course, the situation of individuals or families experiencing poverty for two, three, or more years, known as persistent poverty, is very difficult.

However, the situation is even more difficult for children living in poverty, as this can affect their future prospects and negatively affect their opportunities as adults (vulnerability to poverty).

Significant concern arises from the educational poverty of children and adolescents, defined by Save the Children as "the deprivation, for children and adolescents, of the opportunity to learn, experience, develop, and freely flourish their talents and aspirations." There is still a need to fully define educational poverty and identify suitable indicators to monitor and map it (Save the Children, 2015; Pratesi, 2022).

Lastly, in an even worse situation of destitution, we find the homeless. According to Istat's estimates, on December 31, 2021, in Italy there were 96,197 homeless individuals.

(ii) Relative economic poverty.

In this field, the European Union, through Eurostat, has established certain definitions and measures to be developed based essentially on data obtained through the EU-SILC survey (Eurostat, 2015; Eurostat, 2023).

In a country, families are considered relatively poor if their income (per equivalent adult) is less than 60% of the median income. Changes over time in this indicator also depend on variations in the median income, making it highly sensitive to economic conditions and to the income level of the reference area.

To complement this indicator, Eurostat has developed several multidimensional indicators. Risk of poverty or social exclusion includes people living in families with low work intensity, at risk of poverty, and in conditions of severe material deprivation. Material deprivation is based on 9 indicators: (a) Arrears in paying bills, rent, mortgage, or other loans; (b) Inadequate heating; (c) Inability to face unexpected expenses; (d) Inability to have a proper meal at least once every two days; (e) Inability to go on vacation for at least one week per year; (f) Inability to afford a color television; (g) Inability to afford a refrigerator; (h) Inability to afford a car; (i) Inability to afford a telephone. Being in 4 of these 9 situations indicates *severe deprivation*, which can be considered a kind of absolute poverty indicator. *Low Work Intensity* indicator is registered when people live in families with a work intensity lower than 0.20 (total months worked by family members divided by the total theoretically workable months).

As I said before it is now my intention to evaluate briefly if the poverty indicators mentioned above meet the indications of the following three theoretical approaches to defining poverty: (1) The Basic Needs Approach (BNA); (2) The Human Rights Approach (HRA); (3) The Capability Approach (CA), which I summarize referring to what is written in Biggeri and Cuesta (2021).

(c) The Basic Needs Approach (BNA)

This approach conceptualizes needs as those basic goods and services that must be distributed and accessible to all individuals for the full physical, mental, and social development of human personality. This approach primarily focuses on the minimum requirements for a dignified life (such as health, nutrition, water and sanitation services, etc.) and the goods and services necessary to achieve it (Streeten *et al.*, 1981).

(d) The Human Rights Approach (HRA)

The human rights-based approach is the cornerstone for establishing de jure rights (based on legal systems) and, therefore, through the legal system, determining, protecting, and ensuring freedom of opportunity and due process (Santos-Pais, 1999; Sen 2005, 2007). Analyzing the results in terms of rights fulfillment implies setting poverty limits for each dimension (or right) independently of the others. These poverty thresholds are such that being above them implies that the person has sufficient opportunities in quantitative and qualitative terms, and in accordance with the stage of their life cycle.

In this approach, dimensions of poverty are selected because they are expressions of unrealized rights, so they cannot be ranked against each other, and this is considered the most relevant difference compared to the standard economic logic of resource scarcity, which prioritizes poverty dimensions based on their individual or marginal impact on well-being.

It must be noted that some rights have an instrumental role towards others by enhancing them. For example, being educated or healthy is vital also in facilitating other dimensions, both in the short and long term. Furthermore, the BNA and HRA approaches are strongly complementary.

(e) The Capability Approach-(CA)

This approach incorporates many of the concerns regarding the BNA into a fully conceptual framework with an additional emphasis on empowerment (the achievement of self-awareness and control over one's choices, decisions, and actions, and on well-being). See Sen (1985, 1999); Nussbaum (2011).

The perspective of the Capability Approach enhances our understanding of the nature and causes of poverty and well-being deprivation by shifting primary attention from means to the ends that people have reason to pursue and, consequently, towards the freedom to be able to achieve those ends. It certainly goes beyond the resource-based approach, as resources are not considered the exclusive focus of interest for a matter of justice. It considers income as a relevant means but at the same time emphasizes the inadequacy of income as a proxy for people's freedom capabilities.

In line with the theory of capabilities, poverty can be seen as deprivation of opportunities and rights. Some observations on the Capability Approach: the transition from a situation of opportunity rights to that of factual remains a somewhat daunting challenge. It would be appropriate to further explore the theme of equality/inequality of opportunities and the important distinction between exclusive and non-exclusive goods.

It can be observed that many of the definitions and measures of poverty mentioned in the first part of this section use, at least in part, various approaches. I

believe that we should prioritize Amartya Sen's CA, but how to translate into practice, choices and operational definitions all the indications that derive from that approach is still a matter of discussion and improvement.

5. Some guidelines and open issues

5.1. Some guidelines for constructing new measures of absolute poverty

In section 4, I have referred to various situations of poverty in goods and services (and/or population groups) for which it would be appropriate to obtain measures and/or indicators to supplement those already existing on absolute poverty. The following are some examples: clothing poverty, transportation poverty, malnutrition and food insecurity, educational poverty for children and adolescents, and more often the lack of access to vital services such as education, health care, the job market, transportation, and infrastructure.

The Commission will need to address the issue of constructing measures on such aspects or domains by answering the following questions (based on a standard framework):

(i) Is it possible to operationally define the poverty phenomenon or domain of interest?
(ii) Is it possible to measure its presence and intensity? Are there data and statistical information available to obtain such a measure?
(iii) Is it possible to define a threshold below which an individual would be considered in a situation of absolute poverty for the aspects under consideration?

The task is indeed very complex. For instance, referring to the lack of access to healthcare services, it is necessary to define within what distance such services should be available, their quality, cost, and so forth.

5.2. Some issues in interpreting the results of poverty measures

In general, the interpretation of data and indicators on poverty is made difficult by the influence of the time factor, namely the temporal validity of various indicators and particularly of the established thresholds, as poverty levels can change over time due to various factors such as economic fluctuations, policy changes, and natural disasters. Attention should be devoted also to the data quality, which requires careful consideration.

Two specific mentions concern information and methods to be used to correctly interpret the results.

First and foremost, to interpret the results of poverty measures accurately, it is essential to have statistical information on the factors and actors influencing poverty and its characteristics. These may include families, the labor market, the welfare system, social organizations, and the third sector, as well as the social backgrounds of individuals and the existence or absence of social support or safety net programs, and support/help/personal networks. (Saraceno *et al.*, 2020). Also, it is useful to have longitudinal data to monitor changes in poverty over time and assess the effectiveness of poverty reduction policies.

Furthermore, it is important to note that the sets of units (individuals or families) belonging to various types of poverty are "fuzzy" in the sense that units can simultaneously belong to multiple sets, making the interpretation of individual sets difficult. Real-world situations are often characterized by imprecision and vagueness. In this sense, fuzzy-set theory has been shown to be a powerful tool for describing the multidimensionality and complexity of social phenomena, including poverty (Betti and Lemmi, 2021). Additionally, given the multitude of variables under consideration, methods for jointly analyzing these variables and synthesizing them need to be developed (Brandolini, 2021).

6. Data and Statistical Information on Poverty available in Italy

In Italy, there are many indicators of poverty available, including long time series data (Brandolini, 2021).

Istat, following Eurostat's guidelines, has been producing estimates of relative and absolute poverty indicators, providing extensive information on the factors and actors influencing it (for indicators, see sections 4 and 5). These data are derived from both sample surveys and administrative archives and databases, with information also available at the local level.

The Bank of Italy has been conducting an annual survey on incomes and real and financial wealth held by families since the 1960s. Analyses of the results are presented in specific bulletins and reports, and sometimes also in the Governor's report of the Bank.

Many data on poverty are also produced and disseminated by various Public Administrations, whether belonging to the Sistan (the National Statistical System) or not. For example, an important database that contains valuable information about local-level policies is the Integrated Information System of Social Services (SIUSS).

Finally, many data are produced and disseminated by numerous non-profit organizations that focus on poverty and ways to alleviate it. It is not possible to

mention them all, but we can recall organizations such as Caritas, Banco Alimentare, Save The Children, Con I Bambini, ACLI, Ofam, and others.

It is important to note that, while this type of data is certainly useful for providing general indications and for data journalism, they have several limitations. Specifically, they are not always statistically valid and reliable, they are fragmented, and often not comparable with each other and with those published by official statistics.

Therefore, it is essential to engage in activities to integrate all these diverse types of data to make them comparable, thus increasing their "value" and obtaining a comprehensive overview of poverty in all its facets.

7. Implementing a Data Ecosystem to address Poverty

Taking into account what was written in the previous section, my proposal is to initiate an inter-institutional process to implement a data ecosystem on poverty.

In simple terms, we can say that a data ecosystem is an environment that contains different and heterogeneous data from systems and databases of various entities interested in the phenomenon addressed by the system. It provides a data management infrastructure and applications for both scientific analysis and informed policy decision-making processes.

Implementing a data ecosystem to address poverty is a multifaceted endeavor that involves collecting, analyzing, and utilizing various types of data to understand the root causes of poverty, identify vulnerable populations, and design targeted interventions.

Implementing a data ecosystem for poverty analysis and alleviation requires collaboration across owners of data on poverty, which are government agencies, non-profit organizations, academia and the private sector, to harness the full potential of data-driven approaches in addressing one of the most pressing global challenges.

This operation requires a strong political will from stakeholders, the agreement of all actors, substantial investments in infrastructure and dedicated personnel, ensuring data quality (after cleaning and standardizing the original data) and their security and confidentiality with appropriate governance rules. However, the benefits it will produce in terms of increased information value are significant. For example, the following two activities will become very easy: (i) continuously monitoring key indicators and outcomes related to poverty to assess the effectiveness of interventions and make iterative improvements; (ii) conducting rigorous evaluations, including impact evaluations and cost-benefit analysis, to determine the long-term impact of poverty alleviation efforts.

Obviously, the implementation of the data ecosystem requires a project for identifying needs and priorities and implementing it incrementally step by step.

Is it an impossible challenge? I do not think so. On the contrary, I believe it should be faced, and I am confident of its success, especially because in recent years, Istat has gained considerable experience in building various important data ecosystems.

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THE COMPUTATION OF POVERTY SPECIFIC SUB-NATIONAL PPPS FOR HOUSEHOLDS BY USING THE NEW ESTIMATIONS OF ABSOLUTE POVERTY THRESHOLDS PRODUCED BY ISTAT IN 2023

Luigi Biggeri, Monica Pratesi

Abstract. Regional differences in price levels and cost of living have an important impact on the territorial approach to the design and implementation of policies to contrast poverty. Given the regional absolute poverty thresholds produced and published by Istat (Italian National Institute of Statistics) in October 2023, the goal being to evaluate regional differences in prices for the poor, implicit in the thresholds. The long-term goal is to estimate poverty-specific sub-national PPPs. In this paper we present the methodology and the first analysis of the results of the computation of bilateral spatial price indexes for poor households in Italian regions. Methodology and processes can be explored, improved and used in the coming years.

1. Introduction

The estimation of absolute poverty thresholds at a sub-national level is very important both to estimate the number of poor people in various areas and to verify whether there are differences in price levels between these areas[1]. In fact, any regional differences in prices have an important impact on the design and implementation of policies for poverty reduction, at national and local levels (Bishop *et al.*, 2017; Biggeri and Pratesi, 2017).

In 2018, in an article on the adjustment of economic poverty measures to take into account the cost of living, we proposed to evaluate these differences by using the absolute poverty thresholds (Biggeri and Pratesi, 2018). Since 2005 Istat (the Italian National Institute of Statistics) has been estimating absolute poverty and absolute poverty thresholds by geographic area, North, Center and South (Istat, 2009)[2] and we calculated, for the year 2016, the differences in price levels for the three macro areas by type of municipality, obtaining interesting results. Simple

[1] The importance of absolute poverty (ABSPO) estimates in order to highlight the general level of prices and the differences between areas was also underlined in a technical report of the Joint Research Center of the European Commission (Menyhért *et al.*, 2021). The report also notes that the lack of comparable data for ABSPO in different European countries is an important limitation.

[2] For a summary of the definitions and methodology used, in English, see Istat (2022).

specific spatial indices for the poor were implicitly obtained, that could be more adequate for comparing poverty indicators[3].

Recently, in October 2023, Istat produced and published estimates of absolute poverty thresholds for the 20 Italian Regions with reference to the private households resident in Italy (Istat, 2023). We renew our proposal to use the data referred to 2022 to estimate poverty-specific spatial price indices to evaluate the differences in prices between the various Italian regions. The long-term goal is to estimate Poverty Specific Sub-national PPPs , but, as we will see later, at the moment there are many limitations to estimating them. Therefore, in this paper, we present the computation of bilateral spatial price indexes clarifying the meaning that can be attributed to them.

The paper is organized as follows. In section 2, the characteristics (definitions and methodology) of the new estimates of absolute poverty and absolute poverty thresholds carried out by Istat are presented. Section 3 has three objectives: i) to illustrate the basic methodology to compute synthetic spatial price indices (PPPs); ii) to underline that with data currently available it is possible to compute only spatial price bilateral indices; iii) to clarify the meaning that can be attributed to them. Section 4 specifies which bilateral price indices have been computed and presents a short analysis of the main results. Finally, in section 5 we illustrate the main conclusions and suggest a roadmap for further research.

2. The New Estimation of Absolute Poverty carried out by Istat in 2023

In 2023, Istat published a report on the new estimates of absolute poverty carried out for the year 2022 (Istat, 2023b)[4].

The *measure of Absolute Poverty* (AP) is based on the monetary evaluation of a basket of goods and services considered essential to avoid serious forms of social exclusion.

The reference unit of the basket is the household, considered in relation to the characteristics of its individual members, their specific needs (for example, for nutritional needs) and any economies of scale or forms of savings that can be

[3] On the need to use spatial price indices to correctly compare poverty indicators, see Deaton (2005); Deaton and Dupriez (2011).

[4] The new estimates were developed on the basis of the update of the estimation methodology defined within a specific national Study Commission appointed in December 2021, chaired by the president of Istat and which includes representatives of the academia, the Bank of Italy, experts of various bodies and Istat (Istat, 2023b). The Commission began meetings in January 2022 with continued assistance for processing and experiments by Istat's researchers. We must applaud the Istat researchers for the enormous work carried out with high competence and efficiency and in good time having published the data on absolute poverty in the month of October 2023.

achieved when the family composition varies. The essential needs have been identified in adequate nutrition, in the availability of a dwelling of size appropriate to the size of the household, heated, equipped with the main services, durable goods and accessories and in the minimum necessary to dress, communicate, get informed, move around the territory, educate and maintain good health. The basket is divided and composed into three macro components: food, housing and residual components. The monetary value of the overall basket is obtained by direct summing the values of the various components.

The *Absolute Poverty Basket* (APB) is the set of good and services considered essential to assure a minimum life-standard to an Italian household with certain characteristics. The definition of the Absolute Poverty Baskets (APBs) is the starting point for the process of constructing and evaluating Absolute Poverty Thresholds (APTs), which is outlined below. (see Istat, 2023b; Cutillo *et al.*, 2022).

The first step is the identification of individual and household essential requirements, referring to the idea of an acceptable minimum standard of living: a household that cannot afford to purchase goods and services essential to meet these basic requirements (or needs) cannot attain an acceptable standard of living, although modest, in the social context in which it lives. The second step is the identification, for each essential requirement, of specific goods and services to be included in the basket summarizing basic needs. The third step is the identification of the sources for evaluating the costs of goods and services in the basket. Finally, the fourth step concerns the final definition of the thresholds, i.e. the minimum value of economic resources necessary to a household so as not to be defined as absolutely poor.

The *Absolute Poverty Thresholds* (APTs) represent the minimum expenditure necessary to purchase the goods and services included in the basket of absolute poverty. Absolute poverty thresholds vary, by construction, according to the size of household, the age of its components, the area of residence and the size of the municipality of residence.

In fact, the APTs are classified by:

a) Size and age of the components of the household; the reference age classes are 7 (0-3, 4-10, 11-17, 18-29, 30-59, 60-74, 75 and over). An Equivalence scale is taken into account in order to compare household consumption expenditure when dealing with different-size households.
b) Area of residence: 20 regions.
c) Demographic size of the municipality of residence in the Region: Istat identified three groups of municipalities: Center municipalities of a metropolitan area, Suburb municipalities of a metropolitan area and municipalities with 50,001 inhabitants and above, Other municipalities up to 50,000 inhabitants.

Therefore, it is not a single threshold, but as many absolute poverty thresholds as the combination of the above-mentioned criteria of classification.

In the following, we recall the definitions used to construct the poverty thresholds.

2.1. Monetary estimation of the absolute poverty baskets and thresholds

The criteria used to assess the monetary value of the absolute poverty basket are different for the three macro components of the basket: Food, Housing and Residual.

(i) Food: definition of minimum needs and prices used

- the number of foods considered is 96); the daily needs are based on the recommended intake levels of nutrients evaluated by the CREA Italian Research Centers, Food and Nutrition.
- the monetary value is calculated on the basis of a minimum average price obtained as a weighted arithmetic mean of the minimum prices charged in the various types of distribution channels at provincial and regional level (considering only the prices belonging to the lower tail of the distribution, first quintile). That is the minimum price accessible to all households, taking into account the characteristics of the offer in the different territorial realities.

(ii) Housing definition of minimum needs and prices used

- housing needs which refers to the availability of a dwelling of adequate size according to household size and equipped with heating and main services, durable goods and accessories;
- The housing minimum requirement is defined through a ministerial decree, which establishes parameters for granting the habitability (Ministerial Decree 5/7/1975).
- Housing needs are classified by size of the house in square meters (m^2) based on household size (components: 1 = 32.5 m^2; 2 = 39.5 m^2; 3 = 46.0 m^2; 4 = 58 m^2; 10 m^2 additional for each additional component);
- The monetary value of rents is computed in euros per square meter using the database of all real estate rentals from the Revenue Agency. Only economic types of homes were considered, using data by surface classes, type of municipalities and region.
- Electricity, hot water and gas: the minimum need is based on the spending of the households with essential energy consumption.
- Heating: the minimum requirement is established on the basis of European legislation on the matter, based on the climate zone and the time of

construction and the type of home; the monetary value is obtained on the base of unit prices from Arera (Energy Agency)/Istat

(iii) Residual Component

The costs of textbooks and tuition fees for primary and secondary schools were directly assessed.

For the remaining goods and services consumed - i.e.: for clothing and footwear, communications, transport, education, healthcare - the value of the expenses was direct estimated with a linear regression model with intercept that relates household expenditure on food and non-alcoholic beverages to spending on all goods and services considered in the residual component. It takes into account the effect of the household members' number and age composition and the impact of savings/non-savings behavior.

Essentially, the monetary evaluation of poverty baskets was carried out starting from the *hypothesis that primary needs of goods and services that meet each type of households are homogeneous across the country* (except that for energy and heating).

The cost for the basket of goods and services of absolute poverty and thresholds for each type of household at a territorial level is obtained using the prices existing in the various areas of the country at a provincial and regional level. Therefore, the expenditure for each type of household in the different regions will be different in relation to any different price level.

At the end of the monetary evaluation process described, the value of the different *Absolute Poverty Thresholds (APT) is expressed in euros per month*. Since, as mentioned, the APTs vary by construction, according to the type of household, by region and by size of the municipality, Istat has published the absolute poverty thresholds for the 20 Italian regions and for the 3 types of municipalities, for 50 typologies of households[5].

On the basis of the thresholds, Istat computes:

- *Households Absolute Poverty*: Households with a monthly expenditure equal to or less than the value of the absolute poverty thresholds are classified as absolutely poor.
- *Number of absolutely poor:* The estimate of the number of absolute poor must therefore refer to the expenses incurred by household resident in Italy. This is captured through the Household Budget Survey (HBS) which aims to

[5] The absolute poverty thresholds can and have been calculated regardless of whether a certain type of household is present in the area taken into consideration. In this case we are dealing with virtual thresholds, in the sense that the threshold represents the expenditure below which the household of that type would have been considered in absolute poverty if it had been present in that territory.

measure the structure and the level of consumption expenditure according to the main social, economic and territorial characteristics of resident households (Istat, 2023a).

Istat, using these estimates and information on absolute poverty thresholds, estimates the *Incidence of Absolute Poverty* and the *Intensity of Absolute Poverty*.

3. The theoretical basis for calculating poverty-specific spatial sub-national price indices using absolute poverty thresholds: meaning, issues, and challenges

3.1. The theoretical basis

The APTs computed and published by Istat can be used to appreciate the differences in the levels of prices that the poor households find in the markets of the three types of municipalities within the 20 Italian regions, and then, to calculate poverty-specific sub-national Spatial Price Indexes (SPIs).

The assumption is that the primary needs of each type of households, and the baskets of goods and services that satisfy them, are homogeneous throughout the national territory, and represented by this notation q_{i*}^{j} where j is the type of household, i is the product/service and $*$ it means that the quantities are the same throughout the national territory for the type of household j. The approach is the same used by the International Comparison (ICP) of the World Bank to compute the Purchasing Power Parities (Rao, 2013a; Rao, 2013b; World Bank, 2013; Biggeri and Rao, 2021; Laureti and Rao, 2018).

As explained in section 2, the Absolute Poverty Thresholds (APTs) are based on the monetary assessment of the Absolute Poverty Baskets (APBs). The basket is the same in each territorial area and the threshold is obtained applying the average price of the "minimum" market price to each item of the same basket, purchased in the place where the household lives. Given the basket, the assessment is done applying p_{ik}, the average of the "minimum" prices of the product i in the region k, to each item.

The hypothesis of national homogeneity of baskets applies for each type of households, when defined by the number of the components and their age.

The thresholds of each type of household are comparable among the regions because they are based on a basket of identical products and services with the same, or similar, quality. In other words, given the same basket to satisfy the same primary needs, the ratio between two APTs, reflects solely differences in price levels and originates a Spatial Price Index (SPIs). If the above hypotheses are not verified, caution must be exercised in interpreting the results of the calculated SPIs.

More formally, let *i (i = 1,..., i,...N)* be the generic product/ service, *j (j = 1, ..., j, ..., F)* be the type of household, *k (k = 1, ..., k, ..., R)* the regions, and p_{ik} an average of the minimum prices of the product *i* in the region *k*, it is then possible to define a generic poverty threshold (APTs) with respect to the type of household j, and region k as follows:

$$\mathrm{APT}_k^j = C\left(p_{1k}, p_{2k}, \ldots, p_{1Nk};\ U^j\right) \tag{1}$$

where *C* is a cost function which represents the minimum expenditure necessary to attain a given utility level U^j at prices prevailing in a territorial area.

The assumption that the poverty threshold computed by Istat equals this minimum expenditure allows us to write that

$$\mathrm{APT}_k^j = C\left(p_{1k}, p_{2k}, \ldots, p_{1Nk};\ U^j\right) = \sum_{i=1}^{N} p_{ik}\, q_{i*}^j \tag{2}$$

The $\mathrm{APT}^j{}_k$ can be calculated for each type of household and each of the R regions or territorial areas.

The relationship between poverty thresholds referring to the household type in different regions is clear and allows computing SPIs.

For example:

$$\mathrm{SPI}_{rk}^j = \frac{C\left(p_{1k}, p_{2k}, \ldots, p_{1Nk};\ U^j\right)}{C\left(p_{1r}, p_{2r}, \ldots, p_{1Nr};\ U^j\right)} = \frac{APT_k^j}{APT_r^j} = \frac{\sum_{i=1}^{N} p_{ik} q_{i*}^j}{\sum_{i=1}^{N} p_{ir} q_{i*}^j} \qquad \text{for all regions } r \text{ and } k \tag{3}$$

provides a *Laspeyres-type bilateral spatial price index* (the so-called cost of living index) as it compares the cost paid by each type of household *j* residing in region *k* and region *r* to buy a fixed minimum basket of goods and services that provides the same level of satisfaction/utility.

These indexes can be obtained for all types of households and territories for which the poverty thresholds are calculated.

In the case of spatial comparisons, comparisons between all pairs of regions are of interest and, therefore, the main aim is to obtain the price index matrix for each type of household *j*, where $\mathrm{SPI}^j{}_{rk}$ measures the price level for the *j*-th household in region *k* relative to the base region *r*.

It is obvious that the indices in the main diagonal of that matrix are equal to 1, and that the indices below the main diagonal are the reciprocal of those found above the main diagonal.

The values greater than 1 indicate that the price level in a region is higher than in the base region.

3.2. Meaning, issues, and challenges

With regard to the meaning of SPI^{j}_{rk}, it must be noted that the *hypothesis that primary needs of goods and services of each type of households are homogeneous across the country* (except for the very few exceptions noted in Section 2) is a bit strong, but it should be valid for a fairly large group of territories. If we believe that there are important differences between regions and types of municipalities, it is obvious that in such cases it is necessary to be very careful in interpreting the results of the SPI^{j}_{rk}.

Another problem of interpretation may arise if we take into account that, generally, for the monetary evaluation of the absolute poverty basket (APBs), the minimum prices of the various types of distribution channels at provincial and regional levels, that is at the minimum price accessible to all households, are used. These are not necessarily the prices paid by absolutely poor households. To improve the adequacy of the poor-specific SPI^{j}_{k} it is necessary to know the consumption behavior of poor households at territorial level (possibly at provincial level) and their behavior in order to choose the cheaper products: in other words, we should individuate the markets of the poor. A first tentative survey and analysis has been conducted at national level by Istat (Biggeri and Pratesi, 2022). This line of research was aimed at improving the estimation of the actual prices paid by the poor households in different Italian geographical areas by taking into account their different behaviour in the choice of the outlet where purchase large consumption products. It is certainly a first attempt to individuate the markets of the poor, but further research is needed on this.

Since the final objective is the estimation of multilateral poverty-specific spatial price indices per region (PPP_k), it is obvious that the calculation of the SPI^{j}_{rk} is only a first step of the path that must be followed to arrive at the aforementioned indices.

Anyway, this first step is very useful for analyzing the variability of SPI^{j}_{rk} between and by type of household and by type of municipalities within the region. This will be done in Section 4.

Usually, various issues are encountered in the path to arrive at the estimation of the synthetic indices SPI_k, that is PPP_k (see: Rao, 2013a; Rao, 2013b; World Bank, 2013; Biggeri and Rao, 2021; Laureti and Rao, 2018).

Firstly, it may happen that data in some cells of the SPI^{j}_{rk} index array is missing. In this case it is necessary to resort to imputation methods, the most used of which is the Country Product Dummy Method (CPD) (Rao, 2013b). However, this situation in the APT^{j}_{k} data does not occur.

Secondly, by construction APT^{j}_{k}, and consequently also SPI^{j}_{rk}, are calculated separately for each of the three types of municipalities. Therefore, to obtain the synthetics regional indices it would be necessary to calculate their weighted

arithmetic mean having available the weights represented by the expenses made up by each type of household in the three types of municipalities. These data cannot be obtained from the HBS sample, because of its insufficient sample size. Perhaps the number of each type of household residing in the three types of municipalities could be used as a substitute indicator (even if approximate).

Thirdly, it would be necessary to aggregate the synthetic regional indices relating to the types of households to obtain the multilateral indices SPI_k that satisfy the transitivity property. The operation is a bit complex and can be carried out by applying various methods including the so-called Region-Product-Dummy (RPD) method, that is the regional version of the CPD (Laureti and Rao, 2018; Biggeri and Rao, 2021). Also in this case, the availability of weight indicators for individual types of households would be important.

4. Computation of the poverty-specific bilateral spatial (regional) price indices for type of municipality and type of households: a brief analysis of the main results for 2022

As anticipated in the previous section, we present here the results of a preliminary analysis of the behavior of the bilateral spatial price indices to highlight their variability by type of households within the Italian regions.

The regional poverty thresholds data are downloadable from https://www.istat.it/it/archivio/289724 (accessed in January 2023).

Because of the construction process, the APT^j_k, and consequently also the SPI^j_{rk}, are firstly calculated separately for each of the three types of municipalities.

We must observe that only eleven of the twenty regions host "Center-municipalities of a metropolitan area"; "Suburb municipalities of a metropolitan area and municipalities with 50,001 inhabitants and above" are present in eighteen regions (Regions Aosta Valley and Molise are missing because they do not have municipalities with more than 50,001 inhabitants and above); while "Other Municipalities up to 50,000 inhabitants" are present in all the twenty Italian regions. Therefore, the results of our computations are presented separately for each type of municipality.

To make the presentation of the indices simpler and facilitate comparisons, we use the Tuscany region as the r base, and therefore the values for Tuscany are equal to one for the various indices (Tuscany = 1)[6].

Taking into account our aim, we decided to do the computation of the SPI^j_{rk} only for some types of households considering their presumed frequency and, above all,

[6] The researchers could change the reference region, as they prefer.

their possible socio-economic fragility:(i) households with one member aged 18-29 years ("young singles"); (ii) households with one member aged 75 years and over ("elderly singles"); (iii) households with 1 member aged 11- 17years and 2 members aged 30-59 ("traditional households"); (iv) households with one member aged 0-3 years; two members aged 4-10 years and two members aged 30-59 years; taking into account that Istat (2023a) said that the most marked discomfort is observed for the households with three minors o more ("households with three minors").

4.1. Main general results

4.1.1. Center municipalities of a metropolitan area

As it can be seen from Table 1, the values of the SPI^{j}_{rk} indices confirm the general idea that in Northern Italy, level of prices at which absolutely poor households can make purchases is higher than in the regions of Central and, especially, Southern Italy.

Table 1 – *Center Municipality of a Metropolitan Area - Spatial Price Indices by Region (k) and Typology of Households (j)* SPI^{j}_{rk} *- r is Tuscany = 1.*

Regions	Type of Households				
	1m. 18-29	2m. 18-29	1m. 11-17 2m. 30-59	1m. 0-3 2m. 4-10 2m. 30-59	1m. 75 +
Piedmont	0.84	0.84	0.85	0.87	0.83
Lombardy	1.11	1.10	1.10	1.11	1.03
Veneto	1.00	0.99	1.00	1.00	0.93
Liguria	0.85	0.87	0.72	0.87	0.91
Emilia-Romagna	1.08	1.06	1.05	1.05	1.03
Lazio	0,98	0.99	1.32	1.11	0.92
Campania	0.74	0.69	0.78	0.84	0.56
Apulia	0.74	0.74	0.76	0.81	0.64
Sicily	0.74	0.72	0.77	0.80	0.61
Sardinia	0.83	0.90	0.90	0.90	0.81

Note: The typology of the household is indicated by first providing the number of members and, secondly, the age class to which they belong (i.e. 1 m. 18-29, a member aged 18-29 years).

Generally, prices are higher in the Center municipality of the metropolitan area of Milan (Lombardy) and depending on the type of household, they exceed the prices

of the southern region by a percentage that varies within a range approximately from 40% to 80%. In Lazio (Rome), Campania (Naples), Apulia (Bari) and Sicily (Palermo, Catania and Messina) the households with three minors have to bear higher prices than other types of households, probably for the type of goods and services they need.

A peculiarity worth mentioning: Sardinia (Cagliari) has price levels that are always quite higher (about 12-13%) than the other southern regions for all types of households.

With reference to *elderly singles* - households with one member aged 75 years and over - the highest price level is still found in Lombardy. In Campania prices found by these older persons are 84% lower. In Sardinia the price level is 43% higher than Campania, 33% higher than Sicily, and 27% higher than Apulia.

The *traditional households* with 1 member aged 11-17 years old and 2 members aged between 30 and 59 years old - find smaller differences in price levels in Northern and Southern center-municipalities of metropolitan areas than the type of households mentioned above. The same happen for the *households with three minors*.

A more extensive diffusion of local markets, that usually offer lower prices, can contribute to explain price differences. In southern areas, we expect also lower expenses for housing than in the north.

Estimating the poverty thresholds separately for the Food and for the Housing components - operation that we strongly recommend - would make it possible to clarify the reasons for the differences in prices illustrated above.

4.1.2. Suburb municipalities of a metropolitan area and municipalities with 50,001 inhabitants and above

Even in this type of areas, the level of the prices at which absolutely poor households can make purchases is higher in Northern Italy than in the regions of Central and, especially, Southern Italy (see Table 2). But the differences are a little bit lower. While in Sardinia the price levels for all types of households are always quite higher than in the other southern regions, in Umbria the level of the prices is the lowest in all the central regions, regardless of the type of household.

Generally, prices are higher in Lombardy, but often also in Trentino-Alto Adige and Friuli-Venezia Giulia (where there are no metropolitan areas or cities) and Veneto and Liguria.

In the southern regions the prices of the products and services available are lower in a range from 30-35% to almost 70% depending on the type of households.

However, it must be noted that the specific bilateral comparisons between the prices charged in the regions are, in our opinion, difficult to interpret because they

are influenced by the heterogeneity between the suburb areas of the metropolitan areas and the municipalities with more than 50,000 inhabitants and by the weight in terms of population that these two components have in each region[7].

Table 2 – *Suburb municipality of a metropolitan area and municipality with 50,001 inhabitants and above - Spatial Price Indices by Region (k) and Typology of Households (j) SPI^{j}_{rk} - r is Tuscany = 1.*

Regions	Type of Households				
	1m. 18-29	2m. 18-29	1m. 11-17 2m. 30-59	1m. 0-3 2m. 4-10 2m. 30-59	1m. 75 +
Piedmont	0.91	0.90	0.92	0.93	0.90
Lombardy	1.08	1.05	1.06	1.07	0.99
Trentino-Alto Adige	1.15	1.06	1.09	1.13	0.97
FriuliVenezia-Giulia	0.98	0.97	0.99	1.00	0.98
Veneto	1.08	1.04	1.03	1.04	1.00
Liguria	0.98	0.98	0.81	0.97	1.04
Emilia-Romagna	1.06	1.06	1.06	1.07	1.01
Umbria	0.84	0.84	0.89	0.94	0.84
Marche	0.96	0.93	0.97	0.98	0.92
Lazio	0.92	0.93	0.96	0.93	0.85
Abruzzo	0.85	0.83	0.88	0.91	0.79
Campania	0.82	0.73	0.82	0.86	0.62
Apulia	0.79	0.72	0.79	0.82	0.67
Basilicata	0.83	0.77	0.85	0.86	0.72
Calabria	0.83	0.76	0.83	0.86	0.69
Sicily	0.81	0.74	0.82	0.85	0.67
Sardinia	0.85	0.88	0.93	0.93	0.82

Note: The typology of the household is indicated by first providing the number of members and, secondly, the age class to which they belong (i.e. 1 m. 18-29, a member aged 18-29 years).

[7] In 2009, Istat classification of municipalities used in measures of absolute poverty identified only Metropolitan Areas, Large Municipalities and Small Municipalities (Istat, 2009). In 2015, studying also "the new geography of local systems" the classification was changed and the relationships between the centers of the metropolitan areas and their suburbs were extensively analyzed. The classification of municipalities sorted out three classes mentioned in the text. In 2022 this classification was maintained to ensure the comparability with previous absolute poverty estimates. However, the homogeneity of the level of prices in municipalities of class "Suburb-municipalities of a metropolitan area and municipalities with 50,001 inhabitants and above", has not yet been extensively tested.

4.1.3. Other Municipalities up to 50,000 inhabitants

Also in this type of areas, in Northern Italy the level of the prices at which absolutely poor households can make purchases is higher than in the regions of Central and, especially, Southern Italy. But the differences are a little bit lower. In these areas, the peculiarity of Sardinia - where the price levels are always quite higher than in the other southern regions for all types of households - is still evident. In Umbria a lower level of prices is confirmed when compared to all the other central regions, even if not for all the type of household.

Table 3 – *Municipality up to 50,000 inhabitants - Spatial Price Indices by Region (k) and Typology of Households (j) SPI^{j}_{rk} - r is Tuscany = 1.*

Regions	Type of Households						
	1m. 18-29	1m. 30-59	2m. 18-29	1m. 11-17 2m. 30-59	1m. 0-3 2m. 4-10 2m. 30-59	1m. 60-74	1m. 75 +
Aosta Valley	1,09	1.06	1.09	1.10	1.10	1.06	1.01
Piedmont	0.96	0.94	0.96	0.95	0.95	0.96	0.94
Lombardy	1.10	1.08	1.10	1.09	1.08	1.03	1.00
Trentino-Alto Adige	1.19	1.09	1.16	1.14	1.16	1.04	0.99
Friuli Venezia-Giulia	1.04	1.04	1.08	1.05	1.04	1.05	1.05
Veneto	1.08	1.04	1.08	1.06	1.05	1.03	0.99
Liguria	1.06	1.05	1.07	0.87	1.04	1.10	1.12
Emilia-Romagna	1.10	1.10	1.10	1.10	1.09	1.06	1.05
Umbria	0.91	0.94	0.95	0.94	0.94	0.91	0.91
Marche	0.98	0.99	1.00	0.99	0.99	0.96	0.95
Lazio	0.93	0.97	0.97	0.97	1.00	0.90	0.86
Abruzzo	0.86	0.91	0.93	0.91	0.93	0.85	0.81
Molise	0.81	0.81	0.86	0.81	0.85	0.80	0.75
Campania	0.86	0.85	0.86	0.85	0.88	0.73	0.65
Apulia	0.83	0.83	0.83	0.83	0.85	0.76	0.79
Basilicata	0.80	0.81	0.81	0.81	0.82	0.75	0.68
Calabria	0.81	0.85	0.86	0.85	0.88	0.75	0.67
Sicily	0.85	0.85	0.85	0.85	0.87	0.77	0.69
Sardinia	0.91	0.96	0.97	0.96	0.94	0.95	0.88

Note: The typology of the household is indicated by first providing the number of members and, secondly, the age class to which they belong (i.e. 1 m. 18-29, a member aged 18-29 years).

Generally, prices are higher in Trentino-Alto Adige (may be for the presence of many touristic municipalities), but often also in Liguria, Lombardy and Emilia-Romagna.

In the southern regions the prices of the products and services available are lower in a range from 30-35% to more than 70% depending on the type of household.

The highest price level for *young singles* households with one member aged 18-29 is found in Trentino-Alto Adige. In Campania prices are 37% lower; in Sicily 39%, in Apulia 42%, in Calabria 46% and the lowest is in Basilicata: 48%. In Sardinia the price level is only between 5% and 14% higher than in other southern regions.

With reference to *elderly singles* - households with one member aged 75 years and over - the highest price level is found in Liguria (may be for the presence of many touristic municipalities). In Campania prices found by these older single persons are 73% lower, while in Calabria are 69% lower and in Basilicata 64%, in Sicily 62% and in Apulia 59%. In Sardinia the price level is 35% higher than Campania, 31% higher than Calabria, 26% higher than Sicily, and 24% higher than Apulia.

The *traditional households*, with 1 member aged 11-17 years old and 2 members aged between 30 and 59 years old, find the highest level of prices in Trentino-Alto Adige. In the southern regions the price level is lower, but less than for the two previous types of households. In Basilicata prices found by these types of households are 40% lower, but in Apulia, Calabria, Sicily and Campania are respectively, 36%, 34%, 33%, and 32% lower. In Sardinia the level of prices is only 18% lower than in Trentino-Alto Adige. The same happens for the households with three minors.

5. Concluding remarks: suggestion of a roadmap for further research

The analysis of the computed bilateral spatial price indices presented in the previous section has been surely useful, confirming, among other things, that in Northern Italy the level of prices at which absolutely poor households can make purchases is higher than that the same type of households finds in the regions of Central and, especially, Southern Italy.

The spatial indices related to the different types of families did not show significant differences. However, as we have pointed out, some differences and values are notable and allow for interesting considerations.

However further research is necessary both to improve the meaning and interpretation of the bilateral indices and, above all, to achieve the final objective that is the estimate of multilateral poverty-specific spatial price indices per region (PPPs).

To achieve the first goal we should: (i) test thoroughly the hypothesis that primary needs of goods and services of each type of households are homogeneous across the country; (ii) improve the knowledge of the consumption behavior of poor households in order to choose the cheaper products at territorial level, identifying in which shops and markets they buy the various products; (iii) calculate the Absolute Poverty Thresholds separately for the areas of Suburb municipalities of a metropolitan area and for the municipalities with 50,001 inhabitants and above; (iv) calculate separately the specific Absolute Poverty Thresholds for the food component and for the housing component of the Absolute Poverty Basket (and consequently the specific indices of bilateral spatial prices).

For what concerns the second goal, we have indicated in Section 3 the path and all the steps and activities to be implemented.

The further research activities indicated above require a significant effort, but we are confident that the researchers from Istat and our universities will work hard to ensure that these dreams (visions) are transformed into reality.

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ABSOLUTE POVERTY, ENERGY POVERTY AND WORK INTENSITY. THE AD-HBS DATASET AS A KEY TOOL TO ASSESS THE OVERLAP OF DIFFERENT POVERTY CONCEPTS

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Abstract. Household poverty is a complex phenomenon that may be looked at from multiple perspectives. By using the original dataset AD-HBS – developed by matching microdata from the Household Budget Survey with administrative information from INPS archives – we analyse the overlap between the consumption-based absolute poverty indicator and two other indicators of household disadvantages widely used in Italian research and policymaking, i.e., the energy poverty indicator and the low work intensity index. In other terms, we investigate the joint distribution of the household absolute poverty status and the status defined according to either the energy poverty indicator or the low work intensity indicator. We find a partial – and heterogeneous across the national territory – overlap between absolute and energy poverty, while being in absolute poverty is also positively associated with low work intensity. Overall, datasets jointly recording different determinants of economic well-being, such as the AD-HBS including both income and consumption, may prove to be a crucial tool to study the multidimensional nature of poverty in Italy.

1. Introduction

Poverty is a complex phenomenon that has to do with many economic and social factors. Accordingly, every unidimensional definition might inevitably misrepresent the well-being of some households. For instance, a household with a temporarily low income due to a transitory shock may have high wealth and consumption levels. Similarly, a household with a relatively high consumption expenditure may still be unable to adequately satisfy some basic needs such as heating for specific reasons (weather shocks, poor infrastructure). In other terms, standalone unidimensional indicators provide valuable insights, but jointly considering multiple dimensions or the relationship between more than one unidimensional indicator might greatly enrich the picture. On account of this, when assessing the risk of poverty and social exclusion in EU countries, the European Commission refers, for instance, to the At-Risk Of Poverty or social Exclusion (AROPE) indicator, which is defined jointly

considering monetary poverty, severe material and social deprivation and low work intensity.[1]

On the one hand, looking at household conditions by means of different indicators may enrich the analysis of the different forms of disadvantage in a population. On the other hand, such an approach may also allow to assess whether a specific indicator is able to exhaustively represent the multiple dimensions of household economic disadvantages. Against this background, in the present article we propose two empirical exercises highlighting the importance of this 'pluridimensional' approach to the study of poverty and, more in general, the distribution of well-being.

The poverty measure at the heart of our analysis is the Italian consumption-based absolute poverty indicator. While in most advanced countries, poverty is defined exclusively in relative terms by means of income-based indicators, absolute poverty estimates have been provided in Italy since 2005 drawing on a consumption-based measure of well-being (ISTAT *et al.*, 2009). More in detail, such indicator is based on the reference budgets approach according to which a household is counted as poor if her monthly expenditure is lower than the monetary value of a basket of goods and services that is considered enough to achieve a minimum but socially acceptable standard of living. Compared to income-based measures, indicators based on consumption have the advantage of representing a more stable dimension of well-being and have been found to be closely correlated to economic disadvantage (Meyer and Sullivan, 2012; Brewer *et al.*, 2017).

Recently, the concept of energy poverty has also become central in the public debate. The unprecedented surge in energy prices started in the second half of 2021 has indeed greatly weakened the economic situation of many households and increased perceptions of vulnerability. Despite the relevance of the issue, a consensus on how to measure energy poverty is still missing. In Italy, a specific measure adapting the Anglo-Saxon "Low Income-High Costs" approach to the national context has been introduced in 2015 (Faiella and Lavecchia, 2015). Both the absolute poverty measure and the energy poverty indicator considered herein are based on expenditure data from the Italian household budget survey (HBS) carried out by the Italian National Institute of Statistics (ISTAT).

Our first empirical exercise is thus to explore the degree of overlap of the consumption-based absolute poverty indicator and the energy poverty indicator at household level in 2022. The second one is to analyse, in the same year, the work intensity of households in absolute and energy poverty – captured by the periods spent working in a given year by all household members with respect to maximum potential labour supply – as a proxy of their attachment to the labour market, in order

[1] The material deprivation indicator aims at resembling an absolute poverty indicator since it identifies a number of items (e.g., having an internet connection, being able to afford adequate heating in the home, etc...) for which lack of access signals a standard of living below a threshold considered acceptable.

to provide an overview of the association between these two dimensions of poverty and the lack of work. While, in principle, this exercise could be replicated for preceding years (up to 2014, when the HBS has been extensively reformed), we chose to focus on 2022 to fully capture the effects of energy price inflation. However, assessing the evolution over time of the overlap between these poverty concepts could be a very interesting avenue for future research.

To carry out these exercises we make use of the AD-HBS dataset, recently developed by matching microdata from the Household Budget Survey with administrative information from INPS archives. The AD-HBS dataset has the advantage of recording both detailed household consumption expenditure, included in HBS waves, and the working histories of household members, tracked in INPS archives.

What remains of this article is structured as follows. The poverty concepts used in the empirical analyses are presented in Section 2, while the AD-HBS dataset is presented in Section 3. The results of the empirical exercises are discussed in Sections 4 and 5. Section 6 wraps up and concludes.

2. The poverty measures under scrutiny

In most advanced countries, poverty is defined in relative terms by means of income-based indicators. This means that individuals are counted as poor if their resources – usually their equivalised disposable income – are lower than what is considered 'acceptable'. To determine what is 'acceptable' and identify the poverty line, the relative approach usually identifies the poverty line referring to mean or median equivalised disposable income as benchmark. For instance, according to the most popular indicator in the EU – the At-Risk-Of Poverty rate (AROP) – an individual is poor if her equivalised disposable income is below 60 per cent of national median equivalised disposable income. Specifically, relative poverty measures mostly capture inequality in the bottom tail of the distribution and not (necessarily) deprivation in material living standards (Darvas, 2017). Indeed, in a sufficiently rich country, an individual may be in relative poverty despite being able to access goods and services to afford a decent standard of living. Conversely, using a very low (subsistence) poverty line only a handful of households would be counted as poor. In other words, within relative poverty approaches, the income or consumption of goods and services to be considered as reference may change over time and space together with the social acceptability of certain economic conditions, shedding doubt on the relevance of such poverty definition when comparing individuals' living standards across time or space.

Embracing the complexity of the issue, and after a long-lasting political and statistical debate summarised by Brandolini (2021), Italy has adopted a unique approach to poverty measurement since 2005. Indeed, alongside the standard relative income-based indicators used at the national and the EU level (based on household expenditure and income, respectively), ISTAT provides on a yearly basis estimates of a consumption-based absolute poverty indicator, based on the reference budgets approach.[2] In the present article, we focus on the consumption-based absolute poverty indicator, which has great relevance in the policy debate and has raised renewed methodological interest on account of related statistical advances.

Differently from absolute poverty indicators used in less developed countries – as the 2.15 PPP dollar-a-day line used by the World Bank – the Italian absolute poverty threshold refers to a definition of decent living standards that goes beyond subsistence levels, which bears witness to the unavoidable relative component of every absolute indicator. More specifically, in the Italian case, a household is counted as poor if her overall monthly consumption expenditure – net of some components not related to utility – falls short of a specific threshold defined as the monetary value of a basket of basic (or essential) needs including food, housing, and a residual component related to participation in society (ISTAT *et al.*, 2009).

Despite the assumption of homogenous basic needs across the national territory, poverty lines are household-type specific varying according to household composition (age and number of components), geographical area (due to territorial price differentials) and size of the municipality of residence. The food component of the poverty lines is equal to the cost of a diet providing a minimal caloric intake for each household member according to age; the housing component refers to rental fees and to the costs of providing heating for a sufficiently large house as well as of using the necessary appliances; the residual component is the monetary value associated to the minimum needs in terms of getting dressed, communicating, getting informed, travelling, attaining education and being in good health.[3]

As all consumption-based poverty indicators, the Italian absolute poverty concept has pros and cons. First of all, while consumption is more stable than income across the life cycle, due to saving, and less affected by underreporting of top/ self-employment incomes, it is also highly dependent on preferences and potentially more subject to measurement error (Aprea and Raitano, 2023; Foster, 1998; Ravallion, 2016). A second relevant aspect concerning the measurement of consumption-based absolute poverty is the need for periodic updates to incorporate

[2] While in the relative poverty approach the poverty line is defined referring to the distribution of the well-being variable (e.g., income, consumption) across a given population, in the absolute poverty approach the poverty line is defined irrespective of the distribution of the well-being variable (e.g., its value is independent of mean consumption in a given population).

[3] On the expenditure side, to ensure comparability across homeownership classes, imputed rents are added to the expenditure of homeowners.

changes in habits, technology and consumption choices of individuals. Indeed, such changes may imply non-negligible variations in the basket of goods and services that, in each point in time, is identifiable as an 'essential' basket to avoid serious forms of social exclusion. In addition, statistical advances in terms of the availability of new databases, more granular data and new measurement and analysis techniques may improve the quality of estimates and, consequently, induce a review of the methodological framework used.

On the grounds of this view, in 2021, an inter-institutional scientific Commission on absolute poverty was set up to review the methodology ISTAT had been using for absolute poverty estimates since 2005 and up to 2021. The main innovations regard the following points: 1) a greater territorial articulation of the estimates (i.e., price differentiation at regional level) which provides a better representation of the phenomenon in different geographical areas; 2) the use of new databases to enhance the monetary value calculation of the absolute poverty basket components the thresholds are made of (e.g., the use of the Real Estate Market Observatory database of *Agenzia delle Entrate* for the housing component); 3) the revision of specific aspects of the different components of the absolute poverty basket; 4) the revision of the savings coefficients used to take account of family size (equivalence scales).[4]

As regards the concept of energy poverty, in advanced countries it refers to a condition where purchasing a basket of essential energy goods and services involves an excessive diversion of family resources. This idea was at the heart of the first Anglo-Saxon-based definitions dating back to the 1990s as well as of the recent general definition adopted by the European Commission with Directive 1791/2023, according to which:

'[E]nergy poverty' means a household's lack of access to essential energy services[…] in the relevant national context, […] caused by a combination of factors, including at least non-affordability, insufficient disposable income, high energy expenditure and poor energy efficiency of homes.'

As Faiella and Lavecchia (2021) point out, there are three main approaches to measure energy poverty. The first relies on expenditure data, the second on self-perceptions, and the third on dwelling-specific energy requirements. The latter approach draws on detailed information on dwelling characteristics, which are often not available, but it has the advantage of being independent of preferences.

In Italy, one of the most widely accepted indicators has been proposed by Faiella and Lavecchia (2015) adapting the Anglo-Saxon Low Income-High Costs approach

[4] Further methodological innovations concerned the economic resources indicator ('household expenditure') which is compared with the absolute poverty thresholds to calculate the headcount ratio. Specifically, with the new methodology, the household expenditure indicator, beyond excluding expenditure for extraordinary home maintenance, is calculated net of the municipal waste tax (TARI) and gross of social energy bonuses (for heating and electricity) as well as of rental fees (also imputed) for garages, cellars and parking spaces (which did not previously appear among the expenditure items surveyed).

to the Italian context.[5] More specifically, according to this indicator, households are in energy poverty if at least one of the following conditions is met: i) the share of equivalent expenditure on energy goods and services is at least two times the equivalent national average share and overall expenditure, net of energy goods and services, is below the consumption-based relative poverty line or ii) their expenditure on heating is zero and their equivalised total expenditure is lower than the national median.

The Italian energy poverty definition is thus made of two components: one related to excessively high energy expenditures and one to what Faiella and Lavecchia call 'hidden' energy poverty – i.e., lack of access to heating combined with low overall expenditure. This definition has been used in the energy poverty reports published by the *Osservatorio Italiano Povertà Energetica* (OIPE) since 2019.[6] According to the estimates included in the third report on energy poverty in Italy (OIPE, 2023), 8.5 per cent of Italian households where energy poor in 2021 while according to the latest update (OIPE, 2024), this share declined to 7.7% in 2022.

Finally, in the EU framework, the dimension related to a lack of work in the household is captured by the 'work intensity' intensity indicator (one of the three indicators included in the AROPE definition), that is defined as the ratio between the effective and the theoretical number of months worked by all working age household members in a year. The Low Work Intensity (LWI) indicator is a binary transformation of such concept: LWI individuals are people aged 0-64 years living in households where working age members (those aged 18-64) worked a working time equal or less than 20 percent of their total work-time potential during the previous 12 months. Households of only children and students aged less than 25 are excluded from the calculation. In this article we slightly extend the EU indicator considering as a worker also those who are not retired and are aged no more than 67.

3. The AD-HBS dataset

The AD-HBS is an administrative-survey linked dataset for Italy which has been assembled within a joint research project of the Treasury Department of the Italian Ministry of Economy and Finance (MEF) and the Economics and Law Department of 'Sapienza' University of Rome to *jointly* measure household income and consumption expenditures. Income and consumption are indeed two key dimensions of household economic well-being, and their joint consideration may greatly

[5] This indicator was mentioned in the 2019 Integrated National Energy and Climate Plan (INECP), in the 2017 National Energy Strategy (*Strategia Energeitca Nazionale*, SEN), and in the National Plan for Ecological Transition (*Piano Nazionale di Transizionen Ecologica,* PTE).

[6] For details see the website: https://oipeosservatorio.it

enhance the understanding of the economic well-being distribution and the interrelations of material conditions (Stiglitz *et al.*, 2009, Fisher *et al.*, 2022).

More specifically, the Italian Household Budget Survey (HBS), an annual survey carried out by ISTAT on a representative sample of the population residing in Italy to provide detailed information on household consumption expenditure, has been matched with several administrative archives managed by the Italian National Social Security Institute (INPS) including high-quality information on working histories and various income sources of the interviewed individuals. The match of the data sources is performed deterministically by means of an anonymous matching key corresponding to the individual fiscal code.

The name of the dataset – AD-HBS – underlines its key structural feature. Indeed, the set of information contained in HBS is expanded by adding the administrative individual-level data on each interviewed individual as it results from the archives managed by INPS. The income sources covered by the INPS archives are labour earnings (from employment and self-employment, with several details on working spells experienced by an individual since her entry in the labour market); pensions (also including social and disability benefits); unemployment and family benefits; minimum income (MI) transfers. Wealth information is also available for households filing a specific declaration (*Indicatore della Situazione Economica Equivalente*, ISEE) required to access most means-tested social transfers in Italy. Administrative information is available from 2017 to 2022. Additional information on the characteristics of the AD-HBS dataset is provided by Aprea *et al*. (2023).[7]

To the best of our knowledge, the only other dataset providing similar information is the Survey on Household Income and Wealth (SHIW). The SHIW is carried out every two years by the Bank of Italy and differs from the AD-HBS for two main reasons: first, information on consumption expenditure is much more aggregate in the former; second, income information arises from administrative sources in the latter. In the present article, we use the (latest) 2022 wave of the AD-HBS to carry out our empirical exercise and the administrative information arising from the employment contracts (*estratti conto contributivi*) archive.

For the scopes of the present article, the AD-HBS dataset has some key strengths. First, both the absolute and the energy poverty indicators are based on HBS expenditure data;[8] second, detailed information on labour earnings and working weeks allow us to assess the economic situation of households in absolute poverty

[7] For the 2017 wave, two additional data sources are available: the 2018 personal income tax files (IRPEF) provided by the Finance Department of MEF, which record detailed information on all income sources subject to the personal income tax plus some capital incomes with preferential fiscal treatment in 2017, and the cadastral archives, also provided by the Finance Department of MEF, which record data on real estate holdings and associated (estimated) patrimonial wealth.

[8] Crucially, the AD-HBS also record the household-specific poverty lines by sub-components (food, residence, residual). This allows to perfectly reproduce the official ISTAT estimates in our data.

from multiple perspectives. Finally, knowledge of households' municipality of residence allows us to further expand the information set by using municipal codes to merge a rich set of municipal-level variables (climatic zone, altitude, average fiscal income). This type of information is particularly important to study the heterogeneous distribution of poverty indicators explored in this article.

The AD-HBS dataset also has some weaknesses. First, since the HBS survey has no panel component, consumption expenditure may be observed only once for each household. This specific feature makes it impossible to study consumption dynamics (including absolute poverty persistence). However, administrative income information is longitudinal, thus allowing to track individuals' working histories in detail. At the same time, overall household income is underestimated since some income sources (e.g., business and capital incomes) are not included in INPS administrative archives.

4. Absolute poverty and energy poverty: do the concepts overlap?

In this section we explore the degree of overlap of absolute poverty and energy poverty, which are both based on HBS expenditure data. Applying the Faiella and Lavecchia (2015) methodology to AD-HBS data, energy poverty in 2022 would be 7.6 per cent, 0.9 percentage points lower than in 2021 (according to the above-mentioned estimates of OIPE, 2023). The explanation of such a decrease is not straightforward. Indeed, considering the 2022 energy prices surge, a prediction on energy expenditure variations and, in turn, on energy poverty, drawing on Faiella and Lavecchia (2015) methodology, should take account of a number of elements. On the one hand, if energy goods and services satisfy basic needs, we may expect an increase in energy prices to bring about a greater increase in the energy expenditure shares for households in the bottom deciles of the expenditure distribution due to liquidity constraints. On the other hand, households with higher constraints may be induced to reduce the amount of energy goods and services purchased if price elasticity of demand is high enough. Furthermore, other factors may intervene influencing behaviours and energy expenditures, such as climatic conditions and targeted policy interventions to support vulnerable households. The latter, comprising both energy bonuses and tax cuts, are indeed mentioned as a key factor in energy poverty reduction by OIPE (2024). Comparing expenditure data for 2021 and 2022 using AD-HBS data, we observe a rather balanced increase in the share of electricity expenditures across equivalent expenditure deciles, and the highest increase in heating expenditures is recorded for households in the fifth decile while the lowest for those in the first decile.

To deepen the analysis, we carried out an empirical exercise to explore the relationship between energy poverty and absolute poverty. Before presenting the main results, it is worth speculating on the theoretical overlap of the two concepts. Indeed, while both indicators are based on household expenditure, some key differences should be highlighted. First, differently from the absolute poverty measure, energy poverty is a relative indicator. Second, while the former uniquely draws on the comparison of household expenditures and poverty lines, the latter depends on more than one condition. Finally, high energy expenditures may push some households with no budget constraints out of absolute poverty by increasing total expenditure but also be associated with energy poverty. Indeed, less than 7% of the households with an above-median equivalised energy expenditure are in absolute poverty. Some discrepancies between the two concepts are thus to be expected.

Table 1 shows the cross-tabulation between the absolute and energy poverty condition and confirms the expectation of non-negligible discrepancies between the two concepts: only 37.4 per cent of absolute poor households are also in energy poverty, while only 40.7 per cent of energy poor households are also in absolute poverty.

Table 1 – *Absolute poverty and energy poverty in 2022, households.*

Percentage of the total population			
Absolute poverty	Energy poverty		Total
	Not poor	Poor	
Not poor	87.2	4.5	91.7
Poor	5.2	3.1	*8.3*
Total	92.4	*7.6*	100
Row percentages (wrt absolute poverty)			
Not poor	95.1	4.9	100
Poor	62.6	37.4	100
Column percentages (wrt energy poverty)			
Not poor	94.4	59.3	91.7
Poor	5.6	40.7	8.3

Source: elaborations of the authors on AD-HBS 2022 data.

Figure 1 and Table 2 provide further details on the degree of overlap of absolute and energy poverty. Figure 1 shows the distribution of each poverty concept across Italian geographical macro-areas (North-West, North-East, Centre, South, islands) together with the share of households which are also poor according to the other

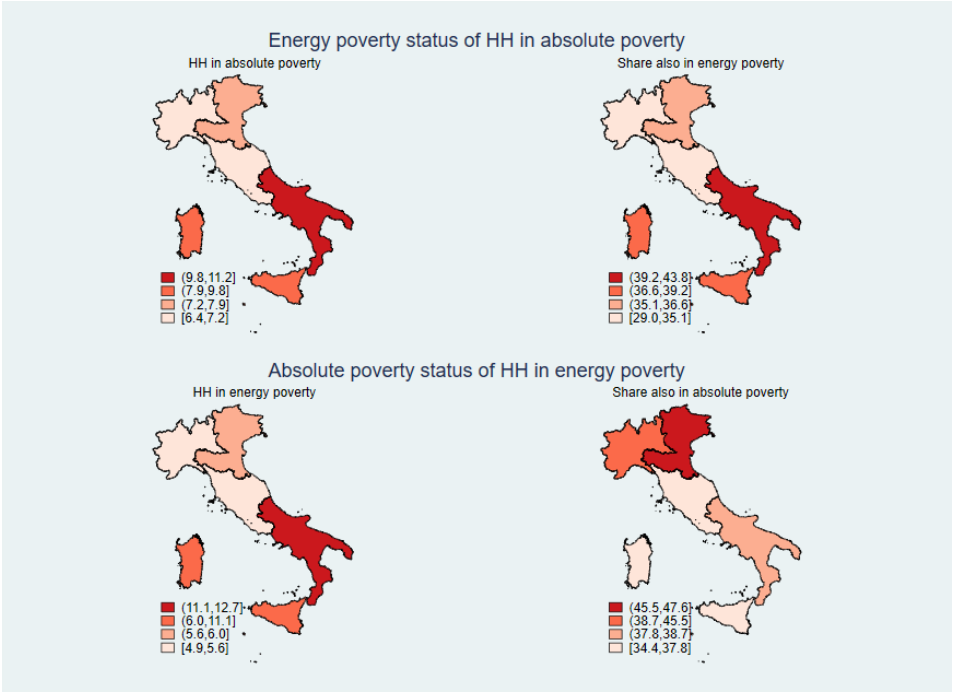
indicator. Table 2 replicates the same exercise combining climatic zone and municipality type.[9]

These elaborations point out some interesting results. First, the incidence of both absolute and energy poverty is much higher in the warmest regions of the country (South and, closely behind, islands), intermediate – but below national average – in the North-East, and lowest in the Centre and in the North-West. Second, the share of households in energy poverty among those in absolute poverty closely follows the distribution of the absolute poverty indicator: the higher the incidence of absolute poverty the higher the share of absolute-poor households also in energy poverty. Also, this share is much higher for small towns across all climatic zones (Table 2). On the other hand, the share of households in absolute poverty among those in energy poverty has an opposite geographical pattern: it is highest in the cold Northern regions and in the islands. Considering municipality type and climatic zone (Table 2), the share follows an inverted U-shape for all municipality types: it increases as average temperature decreases (from climatic zone B to E) and then decreases for the coolest climatic zone F (no data is available for large cities in climatic zone F).

Overall, these results suggest that households in energy poverty living in the North of the country – where, on average, temperatures tend to be lower – have an above-average tendency to be also in absolute poverty (bottom right panel of Figure 1). On the other hand, households in absolute poverty in the South, also have an above-average tendency to also be in energy poverty (top right panel of Figure 1). In the first case, the mechanism driving the overlap seems to be the high energy needs coupled with a fragile economic condition. In the second case, the mechanism seems to be a jointly low energy and total expenditure. Indeed, the share of households in 'hidden' energy poverty (those with zero heating expenditure and below-median total expenditure) is much higher in Southern and warmer regions.

[9] Climatic zone is expressed as a letter from A to F and relates to the municipal average daily temperature such that zone F is the coolest and A is the warmest. Technically it is based on the concept of degree heating days, see DPR 914/93 for details. No town in climatic zone A is present in our data. Municipality types are classified according to the resident population: i) Large: inner urban areas; ii) Medium: peripheral urban areas and cities with more than 50,000 inhabitants); iii) Small: cities with less than 50,000 inhabitants.

Figure 1 – *Households (HH) in absolute and energy poverty: overlap by geographical area.*



Source: elaborations of the authors on AD-HBS 2022 data

Table 2 – *Households (HH) in absolute and energy poverty: overlap by municipality type and climatic zone.*

Geographical cell	HH in absolute poverty		HH in energy poverty	
	Incidence	Of which in EP	Incidence	Of which in AP
B-Large	9.3%	38.1%	10.3%	34.4%
B-Medium	15.9%	46.1%	19.7%	37.1%
B-Small	12.7%	44.0%	16.6%	33.7%
C-Large	9.8%	20.8%	5.5%	36.9%
C-Medium	10.2%	37.9%	9.5%	40.7%
C-Small	10.4%	40.5%	11.2%	37.3%
D-Large	7.2%	27.1%	4.1%	47.4%
D-Medium	5.7%	35.8%	4.5%	45.9%
D-Small	9.5%	42.3%	10.6%	38.0%
E-Large	7.0%	30.3%	4.0%	53.9%
E-Medium	6.6%	35.7%	5.5%	42.4%
E-Small	7.9%	37.2%	6.7%	44.0%
F-Medium	4.0%	25.2%	4.6%	21.7%
F-Small	5.1%	45.4%	6.5%	35.6%
Total	8.3%	37.4%	7.6%	40.7%

Source: elaborations of the authors on AD-HBS 2022 data

5. Absolute poverty and work intensity: what role for the labour market?

In this section we investigate the work intensity of households in absolute poverty. For consistency with Section 4, we also provide the information on work intensity for households in energy poverty. Consistently with the EU framework, we define households with LWI as those where the weeks worked in 2022 by all 'active' members (i.e., those aged 18-67 and not studying or pensioners or disabled) are less than 20% of the potential working weeks (calculated multiplying by 52 the number of 'active' household members). Households with no 'active' members are thus excluded from the analysis. Notice that, differently from the EU definition, we use weeks instead of months, exploiting the more granular information on working spells tracked in INPS archives, and a higher retirement age (67) consistently with the Italian legislation. The distribution of low work intensity class for households in absolute poverty and in energy poverty is presented in Table 2.

Table 2 – *Low work intensity in absolute and energy poor households.*

Row percentages (wrt LWI)			
Low work intensity (LWI)	Absolute poverty		Total
	Not poor	Poor	
Not LWI	92.4	7.6	100
LWI	84.2	15.8	100
Column percentages (wrt absolute poverty)			
Not LWI	80.0	63.6	78.5
LWI	20.0	36.4	21.5
Row percentages (wrt LWI)			
Low work intensity (LWI)	Energy poverty		Total
	Not poor	Not poor	
Not LWI	93.6	6.4	100
LWI	87.5	12.5	100
Column percentages (wrt energy poverty)			
Not LWI	79.6	65.1	78.5
LWI	20.4	34.9	21.5

Source: elaborations of the authors on AD-HBS 2022 data.

The key result is that LWI is much more frequent among households in absolute poverty (36.4%) than in the total population (21.5%). However, most households in absolute poverty (63.6%) have some attachment to the labour market highlighting that, while quasi-joblessness surely plays a role in favouring absolute poverty, low pay and in-work-poverty should also be considered. From the perspective of households with LWI, 15.8% are in absolute poverty – almost double than the share

in the total population. Most households in LWI are nonetheless able to buffer – at least temporarily – the impact of LWI on consumption expenditure and are thus not in absolute poverty. In this context, we should also consider that informal work may also play a crucial role. However, we are not able to observe such aspect in our dataset where working weeks are based on administrative records. Similar results about the link between poverty and LWI emerge when considering the overlap between energy poverty and LWI.

6. Conclusions

In this article we provided some examples of how the AD-HBS dataset may be a key tool for poverty analysis in Italy. More specifically, we argued that the joint analysis of multiple dimensions of well-being allows to assess poverty from a pluri-dimensional perspective. From a policy perspective, the multidimensional nature of poverty should be disentangled by means of different indicators in order to design appropriate policy interventions. In this regard, in this paper we showed that households may be poor according to one or more than one definition and that often poverty measures do not overlap.

Specifically, we examined two specific poverty indicators – consumption-based absolute poverty and energy poverty – and proposed two empirical exercises. First, we explored their overlap and the way it changes across geographical characteristics. Second, we analysed low work intensity in households identified as poor by either of the two concepts.

We found that the overlap between the two poverty concepts is rather low and mediated by geographical and socio-economic characteristics. In addition, poor households – according to both concepts – tend to have a lower level of work intensity. However, a non-negligible share of poor households has high levels of work intensity.

On a final note, the AD-HBS may be used in a variety of additional ways to shed light on other policy-relevant issues. The present article focused on two specific poverty concepts and on labour earnings information, but the AD-HBS dataset may be exploited to investigate several other topics.

Acknowledgements

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THE IMPACT OF THE GLOBAL SHOCKS ON EXTREME POVERTY

Federico Polidoro

Abstract. The recent release by the Italian National Statistical Institute (Istat) of the update of the methodology to estimate absolute poverty in Italy (Istat, 2023) represents an important opportunity to get a snapshot of the international context and of the fight against poverty in the world. This paper focusses on the global shocks that have characterized the last four years (2020-2023) and that have brought a worsening of the international scenario which has undermined the progress achieved. In 2020 the nearly constant decline, occurred in the last three decades, in the number of people living in extreme poverty – defined as those living on less than $2.15 per capita per day at purchasing power parity in 2017 – stopped and this number resumed increasing (reaching 757 million from about 683). The paper, after the introduction, sketches an analysis of the evolution of extreme poverty in the last 30 years, in the different geographical areas of the world. Then, in the third paragraph, the situation in the recent years of the 28 poorest countries and specifically of those belonging to Sub-Saharan Africa is discussed highlighting the inhomogeneity of the impact of COVID-19 crisis and the growing difficulties of this area. The moving away of the United Nations objective of eradicating extreme poverty (reducing the poverty rate to 3% in the World Bank formulation) by 2030 is dealt with in the final paragraph.

1. Introduction

Istat updating of the methodology and estimates of absolute poverty in Italy (Istat, 2023) represents an important opportunity to think about the international context and the fight against poverty in the world.

This updating was released in 2023, when the consequences of the various crisis ("polycrisis"; Bjerde, 2023 and World Bank, 2024a) registered since 2020 were still affecting the fight against poverty that is at the centre of the mission World Bank.

If in 1990 around 38% of the world population was in conditions of extreme poverty, this percentage had fallen to 8.9% in 2019. The trend stopped in 2020, when poverty increased because of the COVID-19 crisis. The World Bank data says that the number of people in extreme poverty (defined as those living on less than $2.15 per capita per day at purchasing power parity in 2017) increased by about 70 million,

reaching over 757 million from about 683. The global extreme poverty rate therefore reached 9.7% in 2020 (World Bank, 2024b).

If compared with other previous global crisis (of different nature, as the financial crisis occurred at the end of the 90s), the increase of poverty due to COVID-19 pandemic is concentrated in the poorest countries. The incomes of the poorest 40% of the world's population fell by around 4% in 2020 with losses that double those of the world's richest, and global inequality increasing for the first time in decades. The poorest have also faced important setbacks in health and education which, if not addressed by political action, will mean lasting consequences on their lifetime income prospects (World Bank, 2022).

The pandemic crisis was followed by the steep rise of consumer prices further supported by the crisis caused by the war in Ukraine.

This means that, in the last four years, a sequence of three shocks of different nature but with global effects, has affected the world.

Therefore, in 2022, the World Bank estimated that there was still a total of 713 million people globally living in extreme poverty, an increase of about 30 million people compared to 2019 that means about 70 million more than the forecasts done in 2019 for 2022. This means that the objective to reduce extreme poverty rate to 3% by 2030 cannot by achieved unless a radical change of the pace of the growth does not take place in in the developing countries.

In short, the global shocks that have characterized the last three years have proposed a worsening of the international scenario which has undermined the progress achieved in the last thirty years.

As aforementioned, one of the reasons of this dynamic is due to the concentration of the worsening of living conditions of people in the poorest countries. The poorest became poorer and the crisis following that of COVID-19 (as the sharp rise of inflation that specifically affected large consumption goods that represent a large part of the consumption expenditure of poorer households) further enhanced this tendency. Thus, the 2022 world poverty rate still above that of 2019 (as estimated by the World Bank), despite the post pandemic recovery and the resuming of a positive tendency of reduction, was mainly due to the crisis in the poorest countries and particularly to those in the Sub-Saharan area.

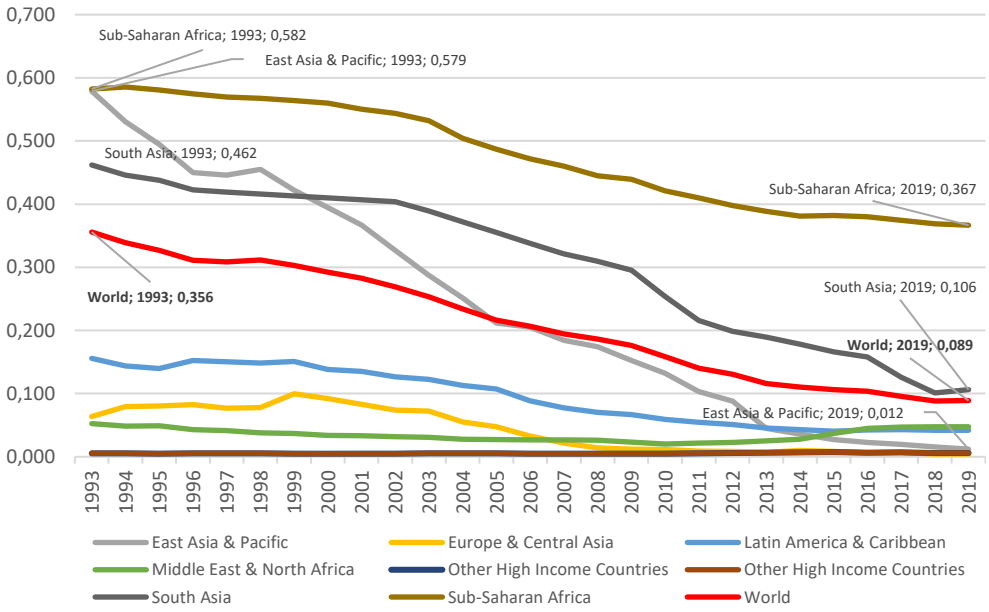
The most recent data that will be disseminated will assess if in 2023 this picture of the world situation and of poverty has started to change or if this inequality in the evolution of poverty between different geographical areas will be confirmed.

A general overview of the history of the last 30 years of extreme poverty indicators can help to understand the past development and some potential future scenarios.

2. The evolution of the extreme poverty in the last 30 years

In Figure 1, the evolution of the poverty rate in the world and in seven macro regions since 1993 to 2019 is represented and it allows understand the contribution of the different areas of the world to its reduction.

Figure 1 – *Extreme Poverty rate in the world and in nine macro regions. Period: 1993-2019. Unit: percent.*



Source: World Bank Poverty and Inequality Platform.

In 1993, the percentage of people living in extreme poverty in the world was equal to 35.6% and it has been decreasing constantly (with exception of 1996-1998, for the 1997 Asian financial crisis, which provoked a 0.2 percentage point increase in global poverty) until 8.9% in 2019. In absolute terms it means that if in 1993 there were almost 2 billion people living below the threshold of extreme poverty, they became less than 700 million in 2019. It was still a huge amount but consistently lower than the figure registered in 1993.

Figure 1 clarifies that the most important contribution to this positive evolution of the living conditions across the world was brought first by East Asia and Pacific region and secondly by South Asia. The decrease of the poverty rate in East Asia and Pacific was sharp and went from 57.9% in 1993 to 1.2% in 2019, that means

from more than 1.1 billion living in extreme poverty to about 25 million: extreme poverty was almost eradicated. Similar but with a less pronounced profile was the evolution of extreme poverty in South Asia (from 46.2% to 10.6%, from 546 million people to 198 in extreme poverty).

The main driver of the sharp decrease of poverty in East Asia and Pacific was China where the poverty rate was almost zeroed in 2019 from the 60.3% of 1993, with more that 700 million people who went out from the extreme poverty in this time span. India also played an important role in pushing the reduction of extreme poverty in South Asia (from 48% in 1993 to 13.2% in 2019 the poverty rate) but with a slower pace compared to that of China (in 2019 in India 183 million persons still lived in extreme poverty).

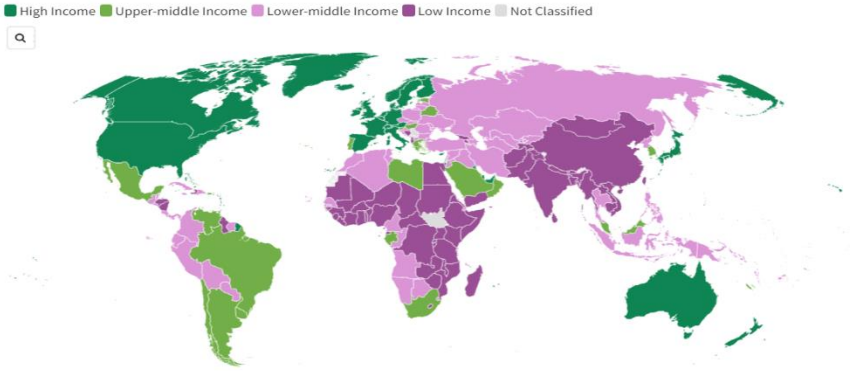
It is evident that in other regions of the world the progress was slower, in particular in Sub-Saharan Africa, where in 2019 (and in 2022 also) a wide part of low and lower-middle-income countries[1] are concentrated.

In Sub-Saharan area, the poverty rate decreased from 58.2% to 36.7%, recording a progress but limited and slow.

The pace of growth of GDP provides a first interpretation of these different dynamics and can be projected to understand 2020 and the evolution of the situation in the post-pandemic years. China, that was evaluated in 1993 as a low-income country, recorded between 1993 and 2019 an average growth of GDP equal to +9.4%, whereas this figure was equal to +3.9% in Sub-Saharan region. If we would consider GDP per capita this gap enlarges because in China, the population grew from 1.18 in 1993 to 1.41 billion in 2019 whereas in the Africa regions considered, the population more than doubled (from 560 million to 1.12 billion persons). As a consequence, the average growth of GDP per capita was +8.6% in China and between +1.1% in Sub-Saharan Africa. This slower pace of growth has meant that if in 1993 there were 35 low-income and 8 lower-middle-income countries in this African region, in 2019 41 countries (against 43) were still in this condition even if 18 belonging to the group of lower-middle-income countries. On the same time span China has become an upper-middle income country (Figure 2 and 3).

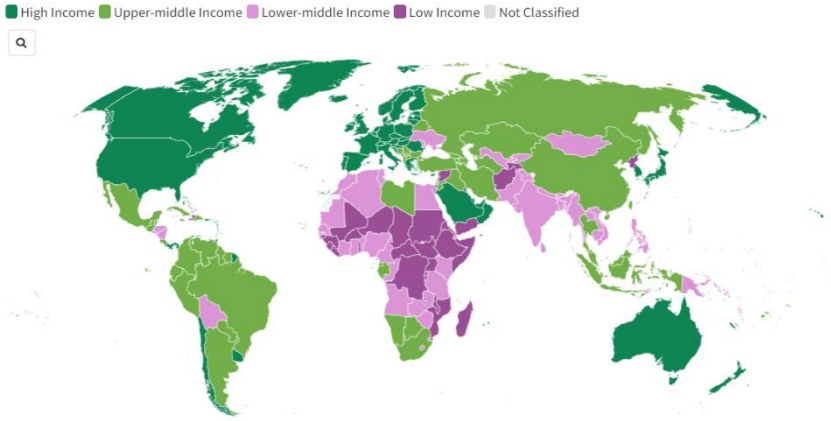
[1] The World Bank classifies economies for analytical purposes into four income groups: low, lower-middle, upper-middle, and high income. For this purpose, it uses gross national income (GNI) per capita data in U.S. dollars, converted from local currency using the World Bank Atlas method, which is aimed at smoothing exchange rate fluctuations, though conversion factor instead of market exchange rates, reducing the impact of exchange rate fluctuations in cross-country comparisons of national incomes.

Figure 2 – *Countries by income groups as classified by the World Bank. Year 1993.*



Source: World Bank Group country classifications by income level (https://blogs.worldbank.org/ en/opendata/new-world-bank-group-country-classifications-income-level-fy24).

Figure 3 – *Countries by income groups as classified by the World Bank. Year 2019.*



Source: World Bank Group country classifications by income level (https://blogs.worldbank.org/ en/opendata/new-world-bank-group-country-classifications-income-level-fy24).

The different dynamics recorded across the countries and the regions in the reduction of extreme poverty, produced an important change in the distribution of the poor people. If in 1993 about 16.5% of world poorest people lived in Sub-Saharan Africa, this percentages rose to almost 60% in 2019. If we consider South Asia, where nearly other 200 million people lived under the threshold of extreme

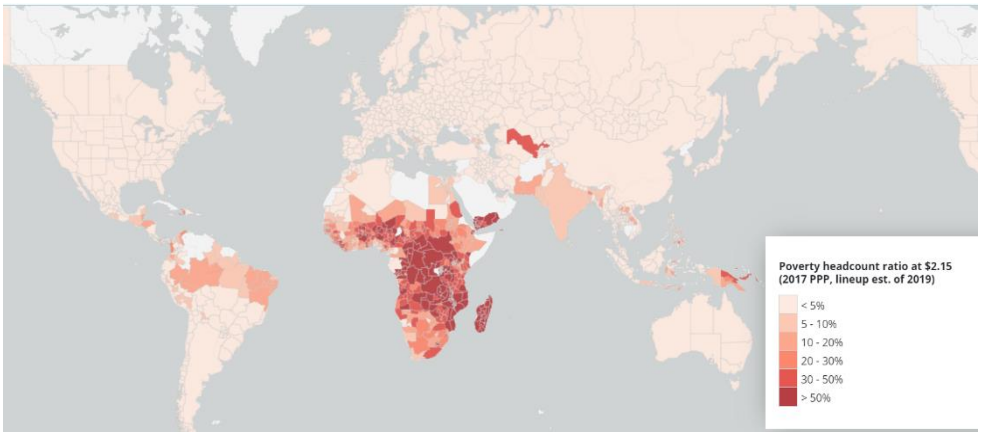
poverty il 2019 (about 29%), the new map of poverty that came out from these 30 years is clear (Figure 4).

In a framework of important achievements around the world, the 30 years ahead of COVID-19 crisis brought a concentration of extreme poverty in some countries and in particular in Sub-Saharan area.

In addition, within Sub-Saharan region, poverty is also increasingly concentrated in Conflict Affected and Fragile States (Fragile and Conflict-affected Situations FCS)[2]: in 2019, 50% of the poor lived in FCS and the perspective is that this percentage will increase until two third (Hoogeveen *et al.*, 2024).

Based on this legacy from the past, the world arrived at the vigil of 2020 and faced the COVID-19 crisis, that worsened the issues emerged.

Figure 4 – *Poverty headcount rate in the World. Year 2019.*



Source: World Bank Poverty and Inequality Platform.

3. The consequences of COVID-19 crisis on the poorest countries

The trend of reduction of the number of people living in extreme poverty stopped in 2020, when poverty increased because of the COVID-19 crisis. As reported in the

[2] The WB classification of FCS uses the following categories:
- Countries with high levels of institutional and social fragility, identified based on indicators that measure the quality of policy and institutions, and manifestations of fragility;
- Countries affected by violent conflict, identified based on a threshold number of conflict-related deaths relative to the population.
(https://www.worldbank.org/en/topic/fragilityconflictviolence/brief/classification-of-fragile-and-conflict-affected-situations)

introduction, the number of people in extreme poverty increased by 70 million, reaching over 757 million from about 683 in 2019 and the global extreme poverty rate increased to 9.7% from 8.9%.

This is a historic setback in the fight against global poverty and, although pre-1990 data is largely imputed based on national (and therefore more uncertain) growth rates, the pandemic shock is likely the largest since 1945. Past shocks (such as the 1997 Asian financial crisis) have affected specific countries or regions and occurred within a short time frame. Quite the opposite, the economic shock due to the COVID-19 pandemic has led to widespread losses of employment and income in every region of the world but it was the poorest countries that have borne the highest costs. The impact of the pandemic crisis worsened the progressive concentration of extreme poverty is some areas of the world: out of the 70 million people more compared to 2019 falling in extreme poverty in 2020, 48 million are estimated living in South Asia, while the remaining, estimated by using nowcasting methods, mainly living in Sub-Saharan Africa.

In 2021 the progressive reduction of people in extreme poverty resumed (from 757 million, people under the threshold of $2.15 per capita per day, decreased to 746) but with a pace that will consolidate the level shift occurred in 2020, consequently moving away the achievement of the objectives of the 2030 agenda which were already difficult to achieve.

In 2022, the pandemic crisis was followed by the steep rise in inflation further supported by the crisis caused by the war in Ukraine, making more difficult the recovery from the consequences of COVID-19.

Indeed, in 2022, it is estimated that around 713 million people are in conditions of extreme poverty, 23 million more if compared to 2019 and 70 million more than expected without the lingering effects of COVID-19 and the following crisis fed by Russian invasion of Ukraine. This means that the path of progressive reduction of extreme poverty has resumed but at a slower pace than expected, with the new international crisis that in the Near East that risks producing new setbacks.

Considering the substantial differences between regions in terms of extreme poverty distribution and the evolution of the last four years (2020-2023), forecasts say that extreme poverty will become increasingly concentrated in sub-Saharan Africa while the other regions will probably reach the 3% poverty rate target by 2030 (even if the conflict and political instability in some countries of Middle East and North Africa, MENA area, could imply local difficulties in achieving this objective). The growth rate of per capita GDP in Sub-Saharan area in 2021 (only +1,6% after the strong decrease of -4.5% in 2020) and 2022 (+1.1%) enhances this negative perspective, given that, to reach the 3% poverty rate target by 2030, Sub-Saharan Africa would need to achieve growth rates approximately eight times higher than the historical ones recorded between 2010 and 2019 (Gill and Kose, 2023).

This is why the 28 poorest countries in the world are experiencing a phase that the Chief Economist of the World Bank, did not hesitate to define as a tragedy (Gill and Kose, 2023).

In fact, looking at data from June 2023, in the 28 poorest countries (where just under 10% of the world population lives) the GDP was estimated at 500 billion dollars, less than 0.5% of global GDP.

Approximately 50% of the population in these 28 countries is poor and yet local governments spend 50% more on defence than they spend on health.

Key indicators of human development are far worse than they were in 2005 (for example maternal mortality is 25% higher or the share of households with access to electricity fell from 52% to around 40%).

This evolution challenges the developed and richer countries, considering that, even before the pandemic, foreign aid to poorer countries, especially in sub-Saharan Africa, was slowing. Now, richer countries are redirecting more of their foreign aid budgets to deal with the wave of refugees (Gill and Kose, 2023). Economic recovery is therefore extremely difficult: by the end of 2024, the average income of people in the poorest countries will still be almost 13% lower than expected before the pandemic. Between 2011 and 2015, external financing accounted for about a third of government revenues in the world's poorest countries but since then this share has fallen to less than a fifth. Thus, it means that the difference was made up by the governments of the poorest countries through further borrowing. Consequently, interest rates have thus risen and the public debt/GDP ratio in these economies has risen from 36% in 2011 to 67% in 2022 (the highest level since 2005, except for 2020).

Fourteen low-income countries are now in debt distress or at high risk of doing so – more than double the number just eight years ago. This means further negative perspective for the fight against extreme poverty (Gill and Kose, 2023).

4. Reducing to 3% the extreme poverty rate by 2030?

The Sustainable Development Goals (SDG) 1 in the 2030 Agenda (United Nations, 2015), is “End poverty in all its forms everywhere”. This general goal is then broken down by targets and two of these targets are, by 2030, eradicate extreme poverty for all people everywhere, and reduce at least by half the proportion of men, women and children of all ages living in poverty in all its dimensions according to national definitions.

Together with goal 1, there is goal 10 (“Reduce inequality within and among countries”), thereof the first target is progressively to achieve, and sustain income

growth of the bottom 40 per cent of the population at a rate higher than the national average.

Concerning the targets of goal 1, more cautiously, the World Bank adopted the objective of reducing extreme poverty rate to 3% percent by 2030. Pursuing this objective is not only linked to robust growth rate but to the reduction of inequality (this is the meaning of second target aforementioned).

Nevertheless, also considering different scenarios in the reduction of Gini index (from a distributional neutral scenario to an optimistic scenario of a reduction equal to 2% per year), the objective of reducing extreme poverty rate to 3% by 2030 is substantially unrealistic (and the reduction of inequality is more effective that higher growth rates), given also the worsening due to COVID-19 crisis (Lakner *et al.*, 2020).

The concern about the 2030 was clearly expressed in the "Political declaration of the high-level political forum on sustainable development convened under the auspices of the General Assembly" of UN (United Nations, 2023), particularly in the points 24, 25 and 26[3]. The main obstacles, to achieve the objectives of the 2030 agenda and highlighted in these points, are the consequences of the pandemic, the effects of climate change, and the conflicts and instability.

The 30-year experience of poverty reduction until 2019 and also some recent experiences in Africa, has highlighted as stability is a precondition of growth and of extreme poverty reduction (Hoogeveen *et al.*, 2024).

Unfortunately, the recent world developments do not encourage optimistic perspectives.

[3] "24. Our world has changed drastically since the first SDG Summit in 2019 and since we adopted the 2030 Agenda in 2015. The world was already off track in achieving the majority of the SDGs before the COVID-19 pandemic. Without immediate course correction and acceleration of progress toward achieving the SDGs, our world is destined to face continued poverty, prolonged periods of crisis and growing uncertainty.

25. We are concerned about the persistent and long-term impacts from the COVID-19 pandemic, continued poverty and widening inequalities, and the multiple interlinked crises that are pushing our world to the brink, particularly in developing countries and for the poorest and most vulnerable. The crisis of climate change and its impacts, including persistent drought and extreme weather events, land loss and degradation, sea level rise, coastal erosion, ocean acidification and the retreat of mountain glaciers, as well as biodiversity loss, desertification, sand and dust storms, and pollution, including plastic, air, and chemical pollution, threaten planet and people. Forced displacement, the cost-of-living, water, food security and nutrition, financial and energy crises and challenges are derailing progress on the Sustainable Development Goals.

26. In many parts of the world armed conflicts and instability have persisted or intensified, causing untold human suffering and undermining the realization of the Sustainable Development Goals. Our efforts to prevent and resolve conflicts and foster peaceful, just and inclusive societies have often been fragmented and insufficient and have been hindered in the current global context."

The persistent Ukrainian conflict, the escalation of Gaza conflict after the terroristic attach of Hamas, the growing instability in fragile and conflict affected States are characterizing the most part of 2024.

Unless important changes in the evolution of these scenarios and in the choices of more developed countries at international level to contrast the consequences of the recent global shocks on the extreme poverty, the poverty and inequality reduction objectives of 2030 Agenda risk to remain unanswered letter.

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MEASURING ABSOLUTE POVERTY IN ITALY: METHODS AND CHALLENGES

Vito Peragine, Giovanni Vecchi

1. Introduction

The production of absolute poverty estimates by the Italian Statistical Institute (Istat) represents a vital public good, serving not only the scientific community engaged in research on distributional and social issues but also the broader national and international community. Understanding the extent and characteristics of poverty is the critical first step in uncovering its root causes and dynamics and designing effective anti-poverty policies. Reliable poverty estimates are a cornerstone for evidence-based decision-making and the formulation of targeted interventions to combat social and economic disparities.

For this reason, Istat deserves commendation for its sustained efforts to produce high-quality poverty estimates and its commitment to continuously refining and enhancing the robustness of the methodologies underlying these measures. Such work not only enriches the body of knowledge but also strengthens the tools available to policymakers and researchers alike.

The contributions to this special issue address various aspects of poverty measurement and analysis. Some papers provide a general theoretical and conceptual framework for defining and measuring poverty, placing Istat's absolute poverty measures within this broader context. Other contributions offer more focused analyses, addressing specific methodological or empirical challenges. Collectively, these papers underscore an essential point: the production of poverty estimates is not a static task but rather a dynamic, iterative process that evolves over time. Improvements are always necessary as new data sources emerge, and novel methodologies are developed.

In this spirit, the present commentary offers critical reflections on potential improvements to Istat's methodology, with the aim of contributing to the refinement of poverty measurement in Italy.

2. The Intrinsic Normative Meaning of Poverty Measurement

Measuring poverty, like measuring inequality, involves navigating a complex set of methodological choices and normative judgments which take place in all the different stages, from data collection to the final presentation of summary indices. As Tony Atkinson frequently reminded us, inequality is inherently a normative concept, requiring decisions about what is fair or just in a society – see, for instance, Atkinson (2015). A similar principle applies to poverty: defining and quantifying poverty entails value-laden judgments about what constitutes a minimally acceptable standard of living, in different contexts, and how to aggregate information to obtain meaningful summary measures.

Consequently, the production of poverty and inequality estimates should meet two key criteria: the techniques should be methodologically robust, and the underlying value judgments should be as transparent as possible. Clarity in these areas is essential to foster meaningful dialogue and critique within both the scientific community and the broader political and civil spheres. This transparency is especially important for estimates produced by a national statistical institute, as they play a central role in shaping public debate and informing policy at both the national and international levels.

The conceptual dimension is particularly relevant, both epistemologically (how should "standard of living" be defined?) and in terms of measurement (how can the chosen definition be empirically approximated?). While the issue is addressed in some of the contributions (see, for instance, the review by Freguja and Polidoro), the trade-offs involved in fundamental choices could be further explored. Should univariate or multidimensional indicators be used? What is the most appropriate unit of analysis: the household, the individual, or the adult equivalent? It would be also highly valuable to discuss whether poverty in Italy is better measured using an income-based welfare indicator or consumption-based indicators: is income or consumption expenditure the better metric? Moreover, currently Istat reports relative poverty estimates based on equivalent income and both absolute and relative poverty estimates based on equivalent consumption expenditure, though with different equivalence scales for each measure. The coexistence of multiple poverty measures – rooted in distinct conceptual and analytical frameworks – besides having some historical reasons (Brandolini 2021), allows the analyst to appreciate different facets of poverty; on the other hand, the multiplicity of approaches is likely to hinder public understanding and political discourse, unless a broader and clearer discussion on the different normative choices underlying the different poverty approaches is provided.

3. Methodological Clarity and Replicability

A related consideration is that the methodology underpinning the production of poverty estimates should be, in general, fully accessible, transparent, and comprehensible.

Accessibility is related both to data availability and to documentation and background papers. This is an intermittent topic in the dialogue between national statistical institutions and other stakeholders interested in accessing microdata from sample surveys[1]. Unfortunately, as of today, access to the datasets used by Istat is not public, which prevents the replication of results, their validation, and the experimentation with alternative strategies.

Regarding transparency, a significant improvement would be to consolidate the methodology into a single, comprehensive source where all necessary details are clearly explained. There are precedents for this approach, such as Istat (2009), which could be usefully revisited and expanded. At present, the methodology is explained across multiple separate documents, none of which provide the level of detail required to fully implement the method. A decisive step toward greater transparency would be the sharing of code or pseudo-code used to produce official estimates. This would allow for an unambiguous implementation of the principle of transparency, ensuring that both methods and results are fully reproducible and open to scrutiny.

Setting aside documentation, the current methodology estimates a very large number of poverty lines, as the calculation mechanism combines information on household members' age and composition, region, and municipality type. Istat shares the thresholds for the 50 most common household types in Italy, which represents only a small fraction of the total number of estimated poverty lines. While the multiplicity of poverty lines could meet the demand for granularity in the analysis, the existence of thousands of thresholds could have a side effect, the reduction the political intelligibility of the estimates as it could fail to capture other territorial differences that could be considered relevant in the public debate (on this, see the discussion in section 5). Additionally, the current methodology does not make explicit the purchasing power adjustments implicit in the use of multiple poverty lines, nor does it clarify how different weights are assigned to individuals based on where they live, their gender, or their age—in other words, the differing needs of households. In short, both spatial cost-of-living differences and equivalence scales, while embedded in poverty estimates, are not explicitly spelled out and consequently not available to discussion.

[1] See, among others, Trivellato (2019).

4. Istat methodology and the international practices

A relevant point relates to the positioning of Istat methodology with respect to the international practices and the scientific debate on poverty measurement.

The main methodologies commonly used by national and international organizations such as the World Bank have foundations in mainstream economic theory (Atkinson 2019). Building on the duality framework developed by Deaton and Muellbauer (1980), Deaton and Zaidi (2002) and Mancini and Vecchi (2022) formulated guidelines on the construction of the welfare indicator, the procedures for making comparisons across time and space accounting for differences in price levels faced by households, and the adjustments required for differences in demographic composition and economies of scale. In parallel, Ravallion (1994, 2016) developed the theoretical foundations of poverty thresholds, also based on the dual problem in consumer theory. Recently, Amendola, Mancini and Vecchi (2025) emphasized the need to integrate these two analytical frameworks and demonstrated that a household can be considered poor if its consumption expenditure falls below a minimum level, defined as the product of an absolute poverty threshold (a scalar) and a true cost of living index. The latter accounts for adjustments to nominal household expenditures (or, equivalently, to the national poverty threshold) before making welfare comparisons and measuring poverty and inequality.[2]

This result helps highlighting an inseparable relationship in any poverty measurement exercise – namely, the link between the welfare measure and a deflator, which adjusts for differences in purchasing power and household composition (differences in needs). If transparency and intelligibility are key objectives, it is essential to distinguish and explicitly separate the three core components: household consumption expenditure, the price deflator, and the equivalence scale. By doing so, poverty analysts can bring to light value judgments, and make explicit the normative assumptions that, in the current methodology, remain implicit. This point is discussed in the contribution by Biggeri and Pratesi, whose conclusions highlight the complexity of the issue.[3]

We conclude this section with one last comment, which stems from considering international practice in absolute poverty measurement. The World Bank recommends the use of the Cost of Basic Needs (CBN) method (Ravallion 1994, 1998, 2016), while the US Bureau of Labor Statistics adopts the so-called Orshansky method. These approaches are not fundamentally different; in fact, under certain conditions, they yield identical results. What unites them is their methodological transparency, the ease of reproducing results, and the straightforwardness of their

[2] See also Amendola *et al.* (2024).

[3] See also the strategy outlined in the recommendations compiled in 2016 by a group of experts on behalf of the World Bank (World Bank 2016).

interpretation. While both methods are not exempt from critiques – see, among others Citro and Michael (1995), or Blank (2008) – they have gained increasing popularity over the past decades. It could be useful to assess the extent to which the current Istat's method deviates, in terms of identification and referencing strategies, but also in terms of results, from these widely adopted approaches. Overall, deviations from international practices can be justified, particularly to account for country-specific contexts; in general, however, it is useful to accompany such departures by an explanation of their rationale.

Poverty estimates, like most social indicators, derive much of their value from their capacity to facilitate comparisons over time and across countries. A systematic discussion of the methodological differences between Istat's approach and other influential international practices, could allow meaningful cross-country comparisons, thereby enhancing the role and utility of Istat's estimates in a global context.

5. The role of public goods and services

In its current methodology, Istat's estimates of absolute poverty account for regional differences in the cost of living for private goods but ignore territorial variations in the value of public goods and services. As the consumption of both categories of goods positively affect the individual economic wellbeing, and considering that, in general, the cost of living (particularly for the housing component, but not only for that) is higher in areas where the amount and the quality of public goods and services is higher, including a correction for only one category, while ignoring the other, introduces a potential severe bias in the estimation of poverty (see for instance the discussion in D'Alessio, 2018).

The inclusion of public goods and services in the assessment of poverty involves important methodological questions. How to evaluate the public services available in a given area? Should the (per capita) public expenditure be considered or the quality of services provided, which of course depends also on the efficiency in their provision? And how to impute such value to different individuals? While some solutions have been proposed in the literature (*e.g.*, Aaberge *et al.* 2010, Alari *et al.* 2010, Baldini *et al.* 2014), further investigation is needed, both in terms of methodology and practical implementation in the Italian context. A deeper reflection on this issue could prompt the demand for new statistical data (on public services) or the adoption of different methodological approaches. On the other hand, this extension would represent an important improvement in order to provide unbiased territorial estimates of poverty and guarantee full comparability of individuals and households living in different territorial contexts.

6. Conclusions

Istat's efforts to produce absolute poverty estimates are highly commendable: Italy's stands out as a welcome pioneering work within the EU context. In this short comment we have focused on a few opportunities for improvement. Ensuring methodological clarity, enhancing replicability, and aligning more closely with—or clearly explaining departures from—international standards would significantly enhance the value and credibility of Istat's work. The consideration of geographical differences in the provision of public services would allow a full comparability, in poverty terms, of individuals and households living in different territorial contexts.

Another consideration is the potential to expand Istat's analytical framework to include the measurement of economic inequality. While poverty—particularly absolute poverty—and inequality are distinct phenomena, they are also closely connected. The theoretical framework outlined in Bourguignon (2004) and its dynamic extension (Ferreira, 2012) highlight the importance of considering economic growth, inequality, and poverty as interconnected phenomena that should be examined jointly. These three measures are mechanically and algebraically linked, and the dynamics of each influence the others. It would constitute a valuable extension, in perspective, to adopt a conceptual approach aligned with the idea that poverty, growth, and inequality are distinct but inseparable aspects of distributional analysis, and to produce inequality, in addition to poverty, estimates based on comparable data and robust methodologies.

By addressing these issues, Istat could further strengthen its role as a leader in poverty measurement and contribute more effectively to understanding and reducing poverty in Italy and internationally.

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