

INCOME DISTRIBUTION & ENERGY POVERTY

A GENERAL OVERVIEW



Hale Kırer Silva Lecuna
Hikmet Gülçin Beken

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PREFACE AND ACKNOWLEDGMENTS

Energy is the silent force moving humanity ahead in a world driven by the continuous pursuit of development. Energy is indispensable to modern living, as it powers our houses, automobiles and industries, and is deeply integrated into our daily existence. However, as advancements occur, they often do so in an unequal manner, resulting in noticeable differences and inequalities that deeply affect our societies.

This book arises at the point where two crucial domains intersect—energy and income. Within the complex network of our interconnected global society, discrepancies in energy accessibility have transformed into a tangible representation of more extensive economic inequities. The notion of energy poverty encapsulates this reality, wherein the inadequacy of dependable energy access significantly impacts the welfare and internal stability of communities.

Energy poverty is a tangible problem that affects real people. The issue is deeply connected to income inequality, since it tells a story in which low-income families, rural communities, and socially marginalized groups are unfairly burdened. The ramifications of energy poverty reach well beyond the simple fluctuation of a lightbulb; they destroy essential human rights, affecting the availability of uncontaminated water, education, healthcare, and the fundamental aspects of a respectable existence.

The objective of this work is to elucidate the intricacies of energy poverty and its interdependent connection with income inequalities. The text explores economic theories, the complex network of poverty, and the subtle aspects of energy poverty. As we explore statistical data, we are faced with the harsh truths of global energy poverty, which highlights the enormity of the situation we are dealing with.

PREFACE & ACKNOWLEDGMENTS

Hale Kırer Silva Lecuna & Hikmet Gülçin Beken

The first chapter of our book largely incorporates Hale KIRER's doctoral thesis, completed in 2011, entitled "Econophysical Approach to the Personal Income Distribution in Turkey and Germany." And the second chapter extensively uses the theoretical aspects of the thesis titled "Conceptualization of Poverty" written by Hikmet Gülçin Beken in 2006.

Gratitude serves as a crucial compass in directing our journey during this joint venture. We express our profound gratitude to our families, whose steadfast support and comprehension have strengthened our dedication to this effort. Their constant patience during extensive periods of research, understating during moments of deep concentration, and support when confronted with obstacles have served as the foundation on which this work is built. This book not only represents our academic endeavors, but also serves as evidence of the combined fortitude and perseverance of our families. We deeply appreciate their unwavering support and encouragement, as it has served as a great source of inspiration for us. Their strong belief in the significance of our work is highly valued. We extend our sincere gratitude to them for their effort and unconditional support, without which this initiative would not have been achievable.

Assoc. Prof. Dr. Hale Kırer Silva Lecuna

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INTRODUCTION

In today's world, energy has become an indispensable part of modern life. The need for energy in areas such as electricity, heating, transportation, and industry affects every aspect of human life. However, the disparities in energy access and usage deeply impact the internal balance and well-being of societies. Income distribution and economic injustices form the underlying basis of these disparities.

Energy poverty refers to the situation where many individuals lack sufficient and reliable access to energy. Low-income families, those residing in rural areas, and socially disadvantaged groups emerge as the segments where energy poverty is most prevalent. Issues related to access to fundamental human rights such as electricity, clean water provision, and healthcare services are closely intertwined with energy poverty. It is evident that energy poverty exerts adverse effects in various fields, ranging from educational opportunities to healthcare services and from economic development to environmental sustainability.

In the realm of income inequality, a significant factor exacerbating energy poverty comes to light. Low-income families struggle to meet their energy costs, while high-income individuals find themselves in a position to access higher-quality and sustainable energy sources. This situation further widens the gap concerning energy access. Families with lower income levels find themselves unable to sufficiently benefit from basic energy services, reinforcing social injustices.

The battle against energy poverty and income disparities demands a comprehensive approach, encompassing not only energy policies but also broad-ranging economic and social initiatives. Policies aimed at reducing inequalities in energy access should be devised to promote social justice. This includes measures such as increasing access to renewable energy sources, promoting energy efficiency, and providing financial support to low-income families for their energy expenses. Additionally, effective

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management of energy usage through educational programs and awareness campaigns, as well as instilling energy-saving habits, holds paramount importance.

Consequently, the fight against energy poverty and income disparities opens the door for societies to forge a more equitable, sustainable, and inclusive energy future. This stands as a pivotal step, supporting not only economic growth but also fostering social justice. By mitigating these disparities in energy access, societies can create a world where everyone enjoys an enhanced quality of life. To achieve this goal, it is imperative to reshape not only energy policies but also economic and social strategies, developing solutions centered around human needs.

Within this framework, the first and second chapters of this book focus on income distribution and poverty theories, respectively. The third chapter delves deeply into energy poverty, providing an in-depth exploration. Moreover, statistical data on global energy poverty is presented in this section. The concluding chapter offers recommendations for the alleviation of energy poverty and improvement of income distribution.

PART I

**INCOME DISTRIBUTION
AND THEORIES**

I

INCOME DISTRIBUTION AND THEORIES

Income distribution has been a topic of extensive debate for centuries. It is possible to argue that economics, in its scientific sense, delves into questioning the wealth of nations. Since then, studies on national income, examining how it differs among countries and changes over time, have always remained within the economists' realm of interest (Sundrum, 1990). However, it is not possible to claim that economists have reached a unanimous consensus on this matter. In this section of the study, a detailed examination of income distribution is conducted. Initially, the concept of income, the problem of distribution, and income distribution are defined. Afterward, a variety of income distribution types and theories are explained.

1. The Concept of Income

Income is defined as the monetary or material gain generated as a result of the production of goods and services within a specific economy during a particular period. However, the definition of income can vary from country to country and from one period to another. This disparity in income definitions might not be significantly crucial for yearly analyzes of a single country; however, it becomes paramount in time-series analyzes and comparisons between nations.

Haig (1921) defines income as “the increase or accretion in one's power to satisfy his wants in a given period insofar as that power consists of (a) money itself, or, (b) anything susceptible of valuation in terms of money.” Income, defined by Plehn (1924), “is essentially wealth available for recurrent consumption, recurrently (or periodically) received. Its three

essential characteristics are: receipt, recurrence, and expendability.” (Wueller, 1938)

Scholars can be broadly categorized into two groups: those who define income as the flow of services provided by wealth and individuals, and those who apply the term to refer to the wealth itself in the form of commodities and services (Hewett, 1925). Income, according to Fisher, is the flow of services over a given period of time, whereas capital is the amount of wealth present at a specific moment in time. Fisher argues that wealth is comprised of material possessions that individuals possess. Services constitute the advantages of wealth (Fisher, 1937).

In all modern societies, households' sources of income include both government and non-governmental institutions. In many countries, the government is the sole and largest employer, responsible for the majority of the population's salaries. Besides its role as an employer, the government also undertakes income redistribution, often providing educational and financial assistance to the low income population using taxes paid primarily by the wealthier segment. Moreover, the government covers military salaries, veteran pensions, civil servant and politician retirement funds, social security contributions, compensation, and unemployment benefits. Non-governmental institutions encompass all fundamental production sectors in the economy, such as agriculture, industry, services, and non-profit organizations. While the government generally serves as the largest employer, non-governmental institutions collectively employ a larger workforce. In emerging market economies, salaries are paid by employers in this category. These institutions, like the government, are responsible for pension payments, allowances for accident victims and disabled individuals. Additionally, employees within this group can benefit from dividends (Campano & Salvatore, 2006, p. 7,8).

2. Distribution Issue and Income Distribution

In economics, three essential questions are explored. The first one concerns how goods and services, essential for basic human needs, should be produced given the existence of limited resources. The second question revolves around the optimal distribution of these scarce resources, aiming to minimize waste and ecological risks. The third question focuses on the fair allocation of the resulting products and services. This latter question constitutes the distribution issue and is encompassed within studies of income distribution. Consequently, income distribution is broadly defined as the allocation of the national income created within a country among individuals, groups, or production factors during a specific period.

Regarding income distribution, two distinct approaches, namely positive and normative, can be distinguished. Positive income distribution primarily deals with statistical analyses, addressing questions such as the composition of the wealthiest and poorest quintiles, the percentage of the population living below the poverty line, and the ideal income model. To answer these inquiries, income density functions are utilized, revealing characteristic features through probability models. Another statistical aspect of income distribution analysis involves the use of data collected from various surveys or tax offices. Within the realm of income distribution, numerous unresolved issues persist, falling into the normative category. These problems pertain to normative income distribution and involve questions about which criteria should be used to measure the fairness of income distribution, which economic system would achieve the most ideal income distribution, which definition of income distribution delineates the poverty threshold, how basic needs are determined, and how much income should be redistributed and in what manner (Campano & Salvatore, 2006, p. 5,6,7).

3. Types of Income Distribution

It is possible to analyze income distribution in various ways. Within this context, four distinct types of income distribution can be discussed: functional, personal, sectoral, and regional. Functional income distribution refers to the share of national income received by production factors contributing to the production process. In other words, it shows the distribution of national income among wages and salaries, interest, rent, and profits. In this context, the functional incomes of factors like interest, rent, and profits are based on ownership rights over production resources (Aksu, 1993, p. 80). This form of income distribution provides insights into how income is distributed among different social classes. Personal income distribution, on the other hand, illustrates the distribution of national income or wealth among individuals and households. In personal income distribution, the quantity of income holds more significance than its source and composition. The degree of inequality and the factors contributing to existing disparities are examined within this section. Sectoral income distribution displays the shares of agriculture, industry, and service sectors from the national income. This segment explores the long-term conditions of these sectors, investigating how income distribution shifts in favor of or against specific sectors. The major challenge in sectoral distribution lies in its intricate connection with the agricultural sector. Regional, or geographical, income distribution showcases the portions of national income or wealth received by individuals residing in different regions within a country (Bronfenbrenner,

1971, p. 27). Thus, differences between developed and underdeveloped regions within a country are identified.

In recent years, there has been a growing interest in personal income distribution. This increased attention has led to the emergence of an extensive literature on this subject. Before delving into the literature of income distribution theories, it is worthwhile to specify the reasons behind the growing interest in personal income distribution. Firstly, in past eras, individuals accepted their economic statuses as a fact of life and submitted to it. However, in today's world, individuals and societies question this situation. Moreover, they can leverage their discontent in ways that can influence state policies to their advantage. Pressures exerted by individuals or society on the government can lead to various state interventions. Despite the long-term growth successes among Western nations under the free market forces of classical political economy in the 19th century, over time, numerous countries have actively intervened in the system, especially due to distributive reasons. In 1977, F. Hirsch argued that advanced economies facing such distributive pressures were moving toward a reluctant collectivism. In less developed countries, the increasing interest in income distribution can be attributed to different reasons. These nations often have a significantly higher percentage of their population living in absolute poverty. In the early post-war period, this widespread poverty was seen as a reflection of low national income per capita in the development literature. The proposed solution was the advocacy for overall economic growth. However, from the mid-1960s onward, doubts arose regarding whether economic growth would gain a specific momentum, beyond the annual rates around 5% experienced by many developing countries. As an alternative, developed countries began to focus on improvements in the national income distribution among individuals and households. In 1969, D. Seers claimed that a country's development depends on three factors. According to him, if a country can simultaneously reduce poverty, unemployment, and inequality to low levels, it signifies progress within the development process. As a result, there has been an increasing interest in personal income distribution analyses in both developed and less developed countries, albeit for different reasons. This trend is attributed to the rapid growth of national income in developed nations, leading to the abundance currently present, and the failure to achieve rapid economic growth in less developed countries (Sundrum, 2003, p. 2,3).

4. Theories of Income Distribution

Income distribution, despite being a highly significant topic in the economic literature and being comprehensively addressed, cannot be claimed to have a complete theory that covers all aspects. According to

(Scitovsky, 1964), a comprehensive income distribution theory should encompass at least four aspects. The first one involves changes in the income levels earned from specific jobs; the second concerns variations in personal income distribution based on scale; the third deals with the functional income distribution among owners of different production factors, and the last one focuses on alterations in the relative magnitudes of different components in personal income accounts.

It can be generally stated that the theories developed predominantly focus on personal and functional income distribution. As mentioned earlier, functional income distribution primarily delves into the returns of production factors, whereas personal income distribution deals with individuals' incomes (Campano & Salvatore, 2006). According to Milton Friedman, functional income distribution is regarded as a reflection of individuals' choices in the market. Here, the value of factors is derived from the value of final goods, which in turn is determined by consumers' preferences among technically available alternatives. On the other hand, in analyses of personal income distribution, individuals' choices in the market are often considered to be independent (Friedman, 1953, p. 277). Here, individuals are viewed as numerous tiny elements within an infinite set. Therefore, the theory of personal income distribution is closely related to statistical analysis that can be applied to any field with a large number of entities (Pen, 1971). In this context, this section of the study covers income distribution theories under two main headings: personal income distribution and functional income distribution.

4.1. Personal Income Distribution

Until the mid-1970s, studies on income distribution were observed to have significant limitations. Despite numerous studies conducted on income inequality and poverty, particularly in the 1960s, on income inequality and poverty, they did not gain widespread acceptance. To address the deficiencies in distribution theories, the works carried out by Jan Tinbergen in 1975 and later by Anthony B. Atkinson and James E. Meade in 1976 drew attention. These new theories were used to test and refine the existing ones. Various theories related to individual income distribution have been developed. However, these theories are broadly divided into two categories: (a) belief-based theories and (b) deterministic theories. According to the first group of theories, individuals can shape their own destinies, significantly influencing the relative incomes of society members. This group ranges from conservative economists' choice theories, believing inequality is a result of voluntary choices, to liberal and radical economists' inheritance and institutional theories, suggesting that this inequality can be reduced by altering social rankings. In the

deterministic group, three different types of theories can be identified. First, there are theories based on abilities, where genetic factors are the fundamental determinants of earnings differences. Second, there are theories assuming that inequalities stem from unalterable changes, luck, and stochastic factors. The last category is life cycle theories, which argue that income inequality is inevitable due to the age factor, a significant element in earning potential. According to this perspective, any reduction in inequalities is short-term (b). However, according to the (a) school, a reduction in widespread inequalities is not only possible but also automatic under specific conditions, such as income surpassing a certain threshold or technological advancements, leading to a decrease in inequality automatically (Sahota, 1978, p. 1,2).

In the context of this broad classification, this section of the book examines seven unique personal income distribution theories, drawing from G. S. Sahota's work in 1978. These theories encompass the theory of ability, stochastic theory, individual choice theory, human capital theory, theories of educational inequality, inheritance theory, and life cycle theory.

4.1.1. Ability Theory

One of the earliest theories regarding income distribution is based on John E. Cairnes' concept of "non-competing groups". Cairnes introduced the concept of diversity among economic agents in classical economic analysis through this theory. He identified four significant non-competing groups: unskilled laborers, which included farmers and those in low-skilled jobs; craftsmen and retailers with a wide range of professions; professionals engaged in highly skilled occupations like engineers and entrepreneurs; and intellectual and artistic professionals such as professors, lawyers, and doctors, working in fields demanding extensive expertise. Cairnes argued that disparities in abilities and qualifications originate from psychological and sociological factors (Dimou, 2004, p. 7,8,9). This perspective was developed in 1869 by Francis Galton and others. According to this view, differences in workers' productivity and consequently their earnings stem from variations in their abilities. In this context, mental and physical abilities follow a normal distribution, and as a natural consequence, income also follows a normal distribution. However, in 1897, Pareto demonstrated for the first time that income follows a lognormal distribution with a right-skewed tail, indicating an unequal distribution of income. Since then, economists have been interested in reconciling and explaining the contradiction between ability and income distribution, leading to the foundation of numerous theories.

4.1.2. Stochastic Theory

The stochastic theory is one of the oldest theories concerning distribution. Here, the skewed shape of income distribution arises from inherent factors or random elements, such as chance. The central idea of the theory is that, even if income and wealth were perfectly evenly distributed at the outset of any generation, inequality could emerge due to stochastic forces. Nearly twenty years before Pareto discovered the law of distribution, D. McAlister derived the lognormal distribution from the multiplicative law of errors. This concept was later employed by C. Kapteyn in 1903 and Francis Y. Edgeworth in 1924. However, the stochastic theory was first formulated in 1931 by Robert Gibrat based on the principle of the "law of proportionate effect", which is a precursor to the central limit theorem. According to this law, a specific income distribution is assumed at the beginning of the model. Individual incomes, denoted by v_t , undergo random increases and decreases over time due to "opportunity" and "chance." Here, v_t represents the variance of annual changes in income in year t , and these changes are unrelated to the income levels they affect. As n approaches infinity, the variance of the income distribution at time $(t+n)$ is denoted as

$$V_n = V_0 + \sum_{t=1}^n v_t, \text{ where } M_0 \text{ represents the mean and } V_0 \text{ represents the}$$

variance. When any v_t is compared to $\sum v_t$, or similarly V_0 to V_n , these values are negligible. In these circumstances, probability theory ensures that income distribution tends to approach normality over time, regardless of its initial state. Personal income distributions aren't typically symmetric; however, the distribution of income logarithms approximates symmetry and tends towards normality. The described random shock process results in a lognormal distribution when applied to the logarithm of income instead of income itself. Consequently, under the appropriate assumption, these random shocks encompass relative or percentage changes in income rather than absolute changes. These fluctuations are independent of income levels. M. Kalecki has pointed out a significant flaw in R. Gibrat's approach. According to him, over time, overall income inequality increases due to the addition of a term to the sum in each subsequent sequential random shock equation. However, this empirical finding contradicts that claim, as confirmed by subsequent research (Mincer, 1958).

4.1.3. Individual Choice Theory

Individual choice theory is an optimization model for income disparities. The theory, formulated by M. Friedman in 1953, asserts that income distribution is determined by individuals' choices among various opportunities. This theory is applicable even when preferences are

uncertain. Regardless of the uncertainty about the future, individuals' preferences will differ, leading to disparities in incomes. Risk is a significant factor in the uncertainty of the future. Individuals' preferences vary based on their attitude towards risk. Members of two communities might have the same set of alternatives. However, one community might be risk-averse, while the other embraces risk. This difference leads communities with identical alternatives to make different choices. For instance, let's assume the fundamental sectors in two different communities are insurance and gambling. In this scenario, income and inheritance taxes increase at a highly progressive rate in the first community but increase less or decrease in the second. As a result, these varying tax policies alter income distributions, with the first community experiencing less income inequality than the second (Friedman, 1953, p. 278).

4.1.4. Human Capital Theory

Human capital theory, following the ability theory, holds slightly more weight compared to other theories. According to this theory, the distribution of acquired human capital is primarily determined by educational achievements and vocational training, which in turn shape earning potential and income distribution. W. E. Huffman emphasized the importance of adapting to external market forces concerning the concept of human capital in the agricultural sector. According to the human capital approach to allocative efficiency, unlike inheritance or ability, distribution capabilities are generally acquired later in life. Allocative ability represents a form of human capital and is attained through education for future periods at a specific cost (Huffman, 1977, p. 60). This theory is perceived as an outcome of individual optimization behavior, calculated based on the present values of income alternatives (Ahearn et al., 1985, p. 1087).

It is possible to trace the human capital theory back to Adam Smith. According to Smith, wages vary based on the cost of learning a work. The most significant contributions to this theory were made by the Chicago school, influenced by Theodore W. Schultz. Since then, microeconomics, labor economics, capital theory, agricultural economics and, overarching them all, income distribution theories have been enriched.

4.1.5. Theories of Educational Inequality

According to this theory, inequalities in education can be observed even among individuals studying in the same educational institutions. According to a study conducted by Joseph McV. Hunt in 1961, general socioeconomic status and intelligence are the fundamental sources of educability (McV, 1961, p. 323). In other words, individuals' abilities,

family structures, and the environment they are in, including students in the same class, affect their educability. The studies conducted by Haywood & Tapp (1966) and Kirk (1964) support this view. In 1964, B. Bloom and his students in Chicago furthered this analysis. According to them, home and other environmental factors are much more closely related to a child's ability than their social status and hereditary traits. Approximately 50% of a child's cognitive development occurs by the age of four or five. These findings align with Martin Deutsch's concept of "cumulative deficit" theory or what Susan W. Gray and Rupert A. Klaus termed "progressive retardation." Gray and Klaus demonstrated a decline in IQ levels for those who grew up in adverse childhood environments (Gray & Klaus, 1970, p. 918). In the 1960s, particularly in the United States, anti-poverty education policies were implemented. These policies were aimed at favoring impoverished children by ensuring equal educational opportunities. Accordingly, practices such as increasing school resources, providing school lunches, offering scholarships, educational loans, covering transportation expenses, granting sports advantages, and providing aid to families were put into effect. Another study conducted by James S. Coleman in 1966 revealed that existing disparities in school inputs lead to minor differences in the development of students' cognitive abilities in terms of school outcomes. There is a high collinearity between ability, family background, and school quality. As a result of these implemented policies, income inequality, or at least poverty, was reduced. However, hopes for a decrease in both educational disparities and income inequality were shattered by a study conducted in 1972 by Christopher Jencks and his seven colleagues. Their five-year-long research indicated that neither family environment, nor cognitive ability, nor school quality significantly determine educational inequality, and none of these factors substantially alter income inequality in terms of educational achievement or occupational status. According to this study, without state intervention, economic success is largely dependent on luck and individual talents. Consequently, non-educational (economic) goals cannot be achieved, and policies aimed at redistributing income do not culminate in educational success (Coleman et al., 1973, p. 1524,1525).

4.1.6. Inheritance Theory

Inheritance constitutes one of the most significant sources of wealth. Therefore, a distribution theory that does not encompass wealth income analysis merely portrays a partial picture. The term "inheritance" mentioned here does not solely refer to material possessions. Human capital can also be left as an inheritance. Human capital inheritance can be categorized into genetic inheritance or biological genetic and cultural capital, or social genetics. Hence, it can be stated that there are three

subcategories: "material inheritance," "genetic inheritance," and "cultural inheritance."

The formal treatment of inheritance in personal income distribution theories can be traced back to the work of Meade (1964). This theory is considered within the historical concepts of the Cambridge functional distribution theory, which is rooted in the Cambridge tradition and explores the distributive effects of property and the analysis of capital inheritance. In the personal income distribution theory developed primarily by Meade from the Cambridge school, inheritance encompasses what he referred to as "fortune." It is said to consist of four fundamental components: the genetic makeup of basic endowments, parental upbringing and education, social relationships, and the inheritance itself. Inheritance factors deserve a significant place in any general theory of distribution (Sahota, 1978, p. 22,24).

4.1.7. Life Cycle Theory

In industrial societies, individuals' earnings tend to increase until a certain age in their life cycle and then decline as they approach retirement ages. Even in societies with stable demographic structures, these changes are linked to two fundamental factors. The first factor is the sheer age, and the second is the preferences for different lifestyles, along with disparities in workplace training opportunities and individual investments, leading to preferences between stable and irregular income streams. Therefore, at any given moment in time, income inequalities will naturally increase. Hence, lifetime income serves as a more appropriate measure for gauging inequality compared to income at any specific point in time. Particularly when compared to household income, it is observed that this method is applied more effectively in individual income measurement.

4.2. Functional Income Distribution

It is possible to trace the origins of functional income distribution back to Adam Smith. Ricardo and Marx are among the economists who made significant contributions to this field. Pigou and Keynes also delved into this subject. In 1955, Nicholas Kaldor provided a standard explanation for the theory. According to him, capitalists invest and accumulate capital with the surplus they generate from what they already possess. Subsequently, they utilize the increased profits for more savings and reinvestment, thus accruing even more capital gains. Capitalists sustain their economic situations through this cycle. On the other hand, workers derive their income solely from their labor and do not engage in savings. This theory is termed the widow's cruse theory. Human capital is disregarded in this

context. Functional distribution encapsulates a scenario corresponding to social classes. The theory can be generalized to allow different rates of savings from distinct sources for workers and capitalists. More recent models from the Cambridge school (Kaldor, 1966; Meade, 1964; Pasinetti, 1962) distinguish between different (positive) saving propensities among social classes and income sources. The accumulation model by individuals within more than two classes was discovered by David Bevan in 1974 (Sahota, 1978, p. 22).

In this section, Classical, Neo-classical, Keynesian, and Post-Keynesian theories are discussed regarding functional income distribution.

4.2.1. Classical Income Distribution Theory

The classical economists investigated the issue of determining the shares of the classes engaged in production. The first systematic exploration of this issue can be traced back to Adam Smith's seminal work, "The Wealth of Nations," while it can be noted that J. B. Say provided the earliest comprehensive definition related to income distribution. According to Say, the problem of distribution arises from each production factor yielding a factor income. This income is assessed in comparison to expenditures. The classical theorists delved into distribution theory at the micro level, examining it as a model comprising three elements: wages, interest, and rent. Later on, Joseph A. Schumpeter introduced a fourth element, highlighting the significance of entrepreneurial profit in functional income distribution (Aksu, 1993, p. 10).

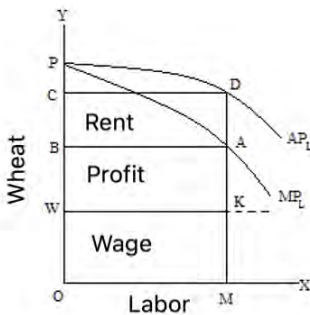
In the context of income distribution, the viewpoints of Ricardo and Marx come to the forefront. Both Ricardo and Marx highlight the interplay between distribution and accumulation as the fundamental factor shaping capitalist dynamics. In Ricardo's framework, this interaction revolves around the relationship between rent and profit, whereas for Marx, it centers on the inherent contradictions between wages and profits (Akyüz, 2009, p. 5). Within this framework, detailed explanations of these economists' perspectives will be provided in the relevant section.

4.2.1.1. Ricardo's Income Distribution Theory

Ricardo (1817) states in the preface of his book, "Principles of Political Economy and Taxation," that determining the laws regulating distribution is the fundamental problem of political economy. Capitalists with fixed and variable capital play a central role in this theory.

Ricardo's theory develops on two fundamental principles: the marginal and surplus principles, respectively. The marginal principle seeks to explain the distribution of rent, while the surplus principle examines the surfeit portion between wages and profits. When explaining his model, Ricardo divides the economy into agricultural and industrial sectors, assuming that the forces governing agriculture also serve to determine the distribution in the industry (Kaldor, 1955). In Ricardo's distribution theory, the focus is primarily on explaining rent rather than profit. In this context, agricultural production serves as the starting point. Ricardo's model specifically considers wheat production, the most crucial agricultural product of his time. This situation is illustrated in Figure 1. Here, OY represents the quantity of wheat (applicable to all agricultural products), while OX represents the amount of labor employed in the agricultural sector. AP_L and MP_L , respectively, indicate the average product of labor and the marginal product of labor. The curves have a negative slope due to the law of diminishing returns. Under certain conditions, for a given labor input like OM, the total product is represented by the area OCDM. Rent is the area between the marginal product and the average product and arises from the varying productivity of cultivated lands.

Figure 1 Ricardian Income Distribution



In classical terms, the marginal product of labor (or product minus rent) is not equal to wages alone; it is equal to the sum of wages and profit. Wage rates are determined not by marginal productivity but by the natural price of labor, which Ricardo assumed to be fixed for wheat. Therefore, the distance OW represents the subsistence level. Consequently, distance BW symbolizes profit per unit of product. Under the assumption of a fixed technology and the existence of a natural wage, Ricardo's theory of income distribution predicts that the relative share of wages in output increases with an increase in product and employment levels. In this scenario, the share of profit diminishes progressively and eventually reduces to zero. Consequently, all capital accumulation, population growth, and

technological advancement in the economy come to a halt. Although technological progress might temporarily suspend this consequence, it cannot eliminate the outcome dictated by the law of diminishing returns (Aktan & Vural, 2002a).

4.2.1.2. Marx's Income Distribution Theory

Marx's theory of income distribution fundamentally revolves around the notion that the surplus produced for the reproduction of labor will end up in the hands of capitalists, while wages will remain at a subsistence level. This theory is essentially built upon Ricardo's surplus theory. Both theories share the premise that laborers gain no economic benefits from economic development. However, they differ in two fundamental aspects. Firstly, Marx does not consider Ricardo's law of diminishing returns, thus there is no analytical distinction between rent and profit in his theory. Secondly, Marx assumes that the supply price of labor (the cost of labor reproduction) remains fixed not only for agricultural products but also for all goods.

Beyond these two fundamental differences, they also diverge in two other aspects. According to Marx, the reserve army of labor prevents wages from rising above the minimum subsistence level. Another distinction lies in their perspectives on capital accumulation. Ricardo posits that the driving force behind capital accumulation is the allure of high-profit rates. In contrast, Marx contends that capitalist enterprises accumulate capital not as a result of their choice but as a necessity arising from internal competition among themselves (Kaldor, 1955, p. 87,88). The increase in the capital used in the production process enhances the average productivity of labor. Meanwhile, maintaining the minimum wage at the subsistence level augments total wages and profits, albeit reducing the share of wage income in total production. Consequently, this elevates the overall share of profits. However, the competition among capitalists accelerates the accumulation of capital. The increase in capital accumulation leads to the employment of more labor with additional capital, thereby enhancing average labor productivity, exploitation rates, and profits. Consequently, surplus value increases. Nevertheless, if the increase in the composition of capital surpasses the surplus value, profit rates begin to decline.

According to Karl Marx and his supporters, since production relations determine income distribution, achieving a new income distribution is only possible through altering the existing system (Aksu, 1993, p. 11).

4.2.2 Neoclassical Income Distribution Theory

Traditional neoclassical economics conventionally encompasses factor pricing and distributive shares in a world of limited market exchange. In other words, the theory of income distribution focuses more on determining factor prices than on determining factor shares. The theory is based on individual profit and utility maximization within a competitive market structure (Braff, 1988, p. 101).

Marx's theory is derived from Ricardo's principle of surplus while the neoclassical value and distribution theory appears as a generalized application of Ricardo's introduced marginal principle to explain rent. However, fundamental differences exist here as well. Firstly, Ricardo only employs the substitution principle (or the limited substitutability principle underlying all marginal analyses) that accepts the use of labor attached to land, while in neoclassical theory, this doctrine is formulated and generalized. Here, the productivity of each factor of production varies according to the quantity used of other factors. Secondly, while Ricardo uses the principle that a fixed factor obtains a surplus from the gap between the variable factor's average and marginal product, neoclassical theory approaches this situation from the opposite angle. For instance, any variable factor in supply receives a remuneration responding to the marginal product under competitive conditions (Kaldor, 1955, p. 89).

In theory, each production factor is employed until its marginal product revenue equals the marginal factor cost. This means that production continues until the monetary value of the last unit of the production factor's contribution to the production equals the payment made for that production factor. Consequently, the level of employment for each production factor and its share in the production output are determined until this equilibrium is reached.

The theory of factor price determination based on marginal productivity is utilized in studies examining the effects of technological advancements on the allocation of other factors. In 1932, Hicks classified innovations as labor-saving, capital-saving, and neutral savings. In this context, labor saving leads to profit when other factors are equal, and wages decrease. However, later, a specific interest in the impact of technological advancement on two factors led to the definition of innovations being based on their effects on these factors. For instance, if factor proportions are kept constant, an innovation is classified as neutral; if labor's share decreases, it is labor-saving, and if capital's share decreases, it is capital-saving. These can be distinguished from one another. Technological progress, if factor proportions in constant output-capital ratio are maintained, is termed Harrod-neutral; if factor proportions in constant

capital-labor ratio are maintained, it is termed Hicks-neutral; and if factor proportions in constant output-labor ratio are maintained, it is termed Solow-neutral. According to this theory, the influence of capital accumulation on factor shares in total production depends on the elasticity of substitution and the tendency of technological advancement. However, there are few reliable predictions for these parameters that could be used to explain observed changes in factor shares. In reality, the general trend in factor shares is important for generating some ideas about the elasticity of substitution and technological deviations. Therefore, the long-term stability of factor shares in developed countries has been considered an artificial reality in explaining certain aspects of their historical experiences. In recent times, neoclassical economists have developed growth theories to explain such realities in developed countries' growth experiences (Sundrum, 2003, p. 161,162).

4.2.3. Keynesian and Post-Keynesian Theories of Income Distribution

It can be argued that Keynes himself showed minimal interest in the issue of income distribution. However, a specific distribution theory can be termed Keynesian if it can be demonstrated through the application of certain tools from Keynesian thought, or if these tools can be utilized to express stages in the evolution of ideas. It could be said that Keynes came remarkably close to developing such a theory. The multiplier principle, when applied to the data of output level and employment, can be used to determine the relationship between wages and prices, or when applied to the data of distribution (such as the relationship between prices and wages), it can determine the level of employment (Kaldor, 1955, p. 94). However, as previously mentioned, it is not possible to assert that Keynes himself directly concerned himself with income distribution. Therefore, in this section of the study, the focus is primarily on the perspectives of Post-Keynesian economists regarding income distribution.

In Post-Keynesian economics, the factor incomes that emerge in income distribution are profits (including interest and rent as a category, as well as dividends and undistributed profits) and wages (encompassing salaries, excluding high-level executives' salaries, which could possibly be considered as part of profits). This theory possesses three distinguishing features. Firstly, it incorporates investment, a significant determinant of profits. Secondly, it assumes that investments are independent of savings, at least over a wide range of possible values, and savings are in harmony with investments. Lastly, it assumes that the saving propensity outside of profits is greater than the saving propensity outside of wages. While this theory is characterized by these unique attributes, there are specific

differences among these three economists: Kalecki in 1942, Kaldor in 1955, Pasinetti in 1962, whose models are particularly noteworthy. Although distinct features differentiating this theory from others are highlighted, there are specific variations among these economists. When evaluating income distribution, Kalecki's theoretical framework resembles Keynes' General Theory. At the core of Kalecki's distribution theory lies the degree of monopoly, disregarding the role of overhead labor in providing wealth through changes that effective demand can cause in income shares, even when mark-up is assumed to be constant (Asimakopulos, 1975, p. 314). Kalecki's analysis concerns itself primarily with situations of short-term equilibrium, characterizing the economy as one operating below full employment and production capacity. However, unlike Keynes, his focus lies in explaining conjunctural models achieved over successive short periods. In Kaldor's model, besides short-term equilibrium, there exists the normal utilization of labor, reaching full employment and the utilization of production capacity. Pasinetti's model, on the other hand, is more specific. Pasinetti's interest lies not only in a situation characterized by long-term equilibrium for labor working at full employment, but he also delves into the consequences of a sustained exponential growth at a fixed rate over a very extended period. In the final model, the relative values of all variables are adjusted to the conditions of a steady state. Kalecki's theory places a strong emphasis on the determination of profits and profit shares, and the assumptions made regarding the degree of competition, market structure, and pricing policy may not significantly impact the outcomes. Kalecki's model exhibits remarkable flexibility, as it encompasses a short period of time that encapsulates key characteristics of modern capitalist economies. Kaldor and Pasinetti's theories attempt to assume both full employment of labor and full utilization of production capacity, making the short-term scenarios they evaluate more specific than those used by Kalecki. For Pasinetti, the equilibrium ratio of profits is the key linked variable at the core of his analysis, associated with long-term equilibrium (Asimakopulos, 1988, p. 133,134).

Kaldor's theory of profit rate and profit share predicts two classes (workers and capitalists), two types of income (wages and profits), and two types of savings tendencies derived from wages and profits. In Kaldor's model, since capitalists do not work and workers who do not save can never become capitalists, these two classes must remain permanent. Furthermore, the distribution between profits and wages precisely elucidates the demarcation between capitalists and workers. In Pasinetti's reformulation, all classes are allowed to earn profits. Pasinetti suggests that capitalists allocate a significant portion of their profits back into savings. Simultaneously, he assumes that workers, even if it is a small portion, save both from their

wages and the surplus income generated from profits (Woodfield & McDonald, 1979, p. 329). As a result, Pasinetti posits three income sources; however, he also employs two savings tendencies in his model. It is crucial to note that while Kaldor's savings behavior is linked to income sources (wages and profits), Pasinetti's approach is instead class-based (workers and capitalists) (Chiang, 1973, p. 311). In Kaldor's theory, a high propensity to save is more a characteristic of commercial firms than individuals (Pasinetti, 1983). Kaldor consistently points to a high propensity to save out of profits. This phenomenon is attributed not to individuals with personal wealth but rather to the nature of business income (Kaldor, 1966, p. 310).

Samuelson & Modigliani (1966) examined certain aspects of the single-sector neoclassical model by substituting Pasinetti's savings function into their own. Their model yields two solutions. In the first one, the equilibrium profit rate aligns with Pasinetti's results. In the second one (also termed as the dual solution), the profit rate is determined independently of capitalists' saving tendencies, while workers' saving propensities are determined by the natural growth rate and the form of the production function. In all these models, except where the assumption of zero saving propensity for workers is made, income distribution is evaluated as the ratio of wages and profits within total income (Woodfield & McDonald, 1979, p. 329,330).

Before concluding the income distribution theories, it is beneficial to consider the perspectives on the macroeconomic effects of income distribution. In this regard, Keynes (1936) emphasized that the impact of income distribution is on total demand. During the 1950s and 1960s, the focus shifted towards the relationship between distribution, trend, and growth. Most of the literature in this period concentrated on the effects of income distribution on savings and consumption. However, interest in distribution somewhat waned during the 1970s and 1980s (Galor & Zeira, 1993, p. 35). In classical theory, inequality stimulates capital accumulation, thereby promoting economic growth. However, in the modern approach, equality in wealthy economies encourages investment in human capital, leading to increased economic growth. This means that the classical approach, starting with Adam Smith and interpreted and developed by economists like J.M. Keynes, W.A. Lewis, N. Kaldor, and F. Bourguignon, has evolved. According to this view, savings rates are a function of increasing wealth. The modern paradigm is dominated by two complementary approaches. The first one is the approach of capital market imperfections, first proposed by O. Galor and J. Zeira in 1988 and 1993. According to this approach, in the presence of imperfections in credit markets, equality encourages investment in human capital and individual-

specific projects in sufficiently wealthy economies, thereby promoting economic growth. The other approach is political economy. According to this perspective, equality reduces the tendency towards socio-political instability and the skewness of redistribution. Consequently, investment and growth are stimulated (Galor, 2000, p. 707).

4.2.4. Normative Economic Approach to Income Distribution

Distributive justice theories are investigated within the field of normative economics. Here, the just distribution of income (rather than the reasons for income distribution) is the main concern. Rescher (1966) addresses the following standards for just distribution in his study, both generally and particularly for every individual. According to him, the distribution can be made in the following ways:

- i) equally (except for a possible negative distribution resulting from a specific negative situation such as punishment);
- ii) in accordance with needs;
- iii) in accordance with abilities, virtues, or achievements;
- iv) in accordance with effort or sacrifices;
- v) in accordance with contributions to actual production;
- vi) in accordance with the public interest, welfare, or the greater good of a greater number;
- vii) in light of economic concepts of supply and demand, based on the value of socially beneficial services determined by scarcity.

In this context, this section will outline Utilitarian Equality Theory, Strict Egalitarianism Theory, Rawls's Theory, Nozick's Theory, Desert-Based Theories, and finally, Resource-Based Theories.

4.2.4.1. Utilitarian Equality Theory

Jeremy Bentham (1781) established a comprehensive framework for applying utilitarian principles to law, governance, and social policy. Although Bentham's utilitarianism was not intrinsically political, it had significant implications for political thought and policy (Viner, 1949). In later publications, John Stuart Mill extended and improved utilitarianism, leading to its development as a fundamental ethical theory (Mill &

Bentham, 1987). Moore (1922) also evaluated utilitarianism more within the context of general ethics than political doctrine. On the other hand, the 19th-century economists who rose to prominence with Pareto, precisely developed the economic aspect of utilitarianism. This situation paved the way for the emergence of 20th-century welfare economics (Rescher, 1966, p. 11).

Welfare-based theories are theories that emphasize the importance of individuals' well-being from a moral perspective. While the goal of welfare economics is to maximize social welfare, it also aims to increase the well-being of the individual's composing society. In this context, all questions related to distribution revolve around which distribution will maximize welfare. Utilitarian Equality Theory is considered a type of welfare-based theory. Utilitarians use the term 'utility' instead of welfare. Utilitarian equality is derived by applying the concept of utilitarian goodness to the distribution problem. To put it simply, the distribution of a homogenous cake among a group of people is the pure distribution problem (Sen, 1979, p. 198). In other words, utilitarians argue that income should be distributed equally to maximize social utility.

Utilitarians are criticized for their failure to consider differences among individuals and for not treating individuals' preferences and interests equally. Additionally, it is argued that there are challenges in defining utility (Stanford Encyclopedia of Philosophy, 2017).

4.2.4.2. Strict Egalitarianism Theory

One of the simplest theories of just distribution is strict egalitarianism, also known as radical equality. According to this theory, every individual should have an equal level of goods and services. At the core of this idea lies the notion that individuals deserve equal respect. In this theory, two problems can be identified. The first is the use of a suitable index for measurement, known as the index problem, and the second is the definition of the time frame. The reason for the emergence of the index problem is the need to measure when goods and services are intended to be distributed according to certain patterns, such as equality. In strict egalitarianism, everyone should have the same level of goods and services. The problem here lies in how these levels should be defined and measured. Regarding the issue of defining the time frame, strict egalitarianism holds two views. The first is the necessity for individuals, who initially have the same goods and services, to be free in how they will use their resources later. This is the principle of the starting gate. The most accepted view of strict egalitarianism is that individuals should always have equal income in every time period. However, if diversity is allowed in individuals' savings, significant

differences can arise between time periods (Stanford Encyclopedia of Philosophy, 2017).

Critics of strict egalitarianism point out that it limits people's freedoms, doesn't treat everyone with the same respect, and says that everyone can openly get richer in circumstances where incomes are not strictly equal.

4.2.4.3. Rawls's Theory

J. Rawls argues for the necessity of equal economic rights and a welfare state for the significance of individual freedom and rights. In his book titled "A Theory of Justice", Rawls puts forth the idea that there are two principles of justice (Rawls, 1971, p. 53). These principles are as follows: (i) Each individual has an equal right to the most extensive basic liberties compatible with similar liberties for others. (ii) Social and economic inequalities should be arranged in two ways. The first is that they are to be to the greatest benefit of the least advantaged, and the second is that all positions must be open to everyone on fair terms. This means that everyone should have equal access to opportunities and resources, regardless of their background or circumstances.

Rawls emphasizes that the first of these two principles takes precedence over the second. The second principle, in its second part, is known as the 'Difference Principle.' The fundamental moral starting point of this principle is that, as in the theory of strict egalitarianism, every individual deserves equal respect. However, the underlying idea here is that the likelihood of earning more income in the near future will bring about greater efforts in production. This situation increases the overall welfare of the economy and, consequently, enhances the wealth of the least advantaged under the difference principle.

The theory of difference is criticized from various perspectives. Advocates of strict egalitarianism argue that the inequalities permitted by the difference principle are unacceptable, even if they benefit the least advantaged. Other criticisms suggest that the theory does not maximize utility, involves unacceptable violations of freedoms, and is not sensitive to individuals' preferences (Stanford Encyclopedia of Philosophy, 2017).

4.2.4.4. Nozick's Theory

Nozick is one of the advocates of the neoliberal movement. In his work, he questions the welfare state. In "Anarchy, State, and Utopia," his 1974 book, he argues that the theory of justice should encompass the following principles (Nozick, 1974): (i) An individual who acquires a property in

accordance with the principle of justice in acquisition is entitled to that property. (ii) An individual who acquires a property through a transfer from someone who is entitled to that property in accordance with the principle of justice in transfer is entitled to that property. (iii) No one can be entitled to a property unless the first and second conditions are fulfilled.

Accordingly, a distribution is considered fair if everyone is entitled to the property they possess according to that distribution.

Nozick classifies theories of justice in two ways. The first is historical or end-state, and the second is patterned or non-patterned. According to Nozick, authorization should be historical and non-patterned. In other words, to determine whether a distribution is just, it is necessary to know how that distribution came about instead of focusing on the end-state. Additionally, the fairness of a distribution cannot be determined by looking at any pattern. Rawls' theory, on the other hand, involves both a pattern and focuses solely on the end-state (Kilcullen, 1996). Processes containing random elements within historical processes can be crucial. A process may start with a just distribution, and transfers made in accordance with the principle of justice can lead to new distributions. However, random elements in this process can result in an unequal end-state in society. Nozick criticizes Rawls for being concerned about the fact that natural assets are randomly distributed, but he himself has not proposed any mechanism to correct the randomness (Varian, 1975, p. 226,227).

4.2.4.5. Desert-Based Theories

Distributive justice theories that build their arguments on the idea that people should bear the costs or benefits according to their merits are known as desert-based theories. Most of these theories are predicated on some concept of merit or deservingness, which is frequently connected to elements like effort, productivity, or moral character. These ideas heavily rely on the concept of desert, which is used to allocate advantages and duties in a just society (Lamont, 1994).

4.2.4.6. Resource-Based Theories

The core emphasis of resource-based theories lies in promoting resource equality. Generally, these theories refrain from anticipating a predetermined output pattern. The underlying concept revolves around the unrestricted determination of outputs by individuals, granting them the freedom to produce varying amounts according to their preferences.

According to Ronald Dworkin, one of the most prominent advocates of resource-based theories, the theory of initial conditions should be rejected. Dworkin argues that the requirements of equality stand in opposite directions. In his view, the distribution of resources at any given time should be more ambition-sensitive. In other words, individuals initially having equal resources may end up in an unequal economic situation as a result of their choices. On the other hand, allowing the distribution of resources at any given time to be endowment-sensitive is not permissible. Inherent inequalities (such as illness or disability) are significant. According to Dworkin, natural inequalities are not determined by individuals' preferences and lead to an unjust distribution. For such situations, Dworkin proposes a hypothetical equalizer. According to this, individuals purchase insurance for situations where they are disadvantaged in the distribution of natural abilities. The payments they make create insurance to mitigate their natural misfortunes (Dworkin, 1981, p. 302,203,311).

4.3. Complexity Approach to Income Distribution

The comprehensive and prolonged research carried out over several years on income distribution, coupled with assessments grounded on current data, suggests that income distribution adheres to a distinct universal model. Econophysics seeks to illustrate this phenomenon using principles derived from natural laws. Income distribution models in mainstream economics are commonly described as lognormal. Nevertheless, employing the lognormal distribution as the best appropriate model for the data has certain challenges. The lognormal distribution is inadequate for explaining the higher ends of income data due to its lack of power-law tails (Willis & Mimkes, n.d.). Econophysics offers techniques to rectify this inadequacy in conventional economics.

The fundamental contributions of physics-based techniques can be summarized as follows (Lux, 2005):

- i) The income distribution structure reveals the existence of two classes in almost all countries. The distribution of income for the majority of the population, which includes the low and middle-income groups, follows a pattern similar to the Boltzmann-Gibbs distribution in physics. On the other hand, the minority group representing the upper-income bracket follows a distribution that resembles the Pareto distribution.
- ii) The distribution is elucidated by the interaction of actors. Classical economics, which is influenced by mechanical principles, aims to understand the behavior of the entire system

by examining its individual components. This approach is similar to the methodological reductionism. According to this perspective, the whole is considered to have no independent existence, and its behavior is governed by the behavior of its constituent individuals, as the whole is comprised of particles. However, this assumption holds true only when the movement of one agent is not affected by another agent, and when there is contact, the collective behavior is distinct from the individual behavior of the particles. In the realm of classical economics, the sole means of contact is limited to the indirect impact of the price system. The quantum revolution has disproven the reductionist hypothesis. In this context, the attributes of individual particles are inconsequential; they can only be discerned by examining the whole. Just like in quantum physics, economic agents engage in interactions, and the actions of society as a whole influence the actions of individuals (Gallegati, 2005).

- iii) The behavior of the majority, when following an exponential or gamma distribution, might be attributed to chance or maximum entropy conditions.

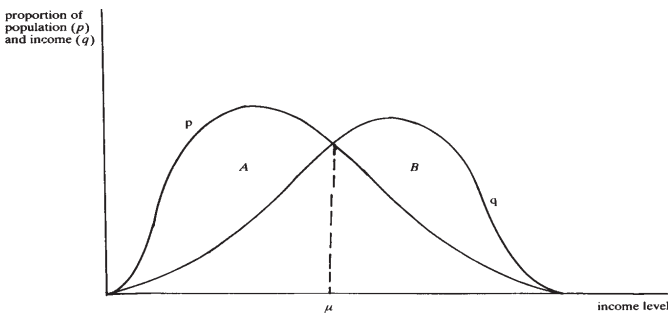
5. Income Distribution Inequality Measures

The measurement and reduction of income inequality in societies is a universally admired objective. Nevertheless, there is frequently a lack of agreement on the appropriate methodology for quantifying it. Currently, numerous statistical methodologies are utilized. According to some authors, the challenge encountered by an economist in developing the approach to measure income distribution inequality is akin to a biologist determining the measurement of inequality in the distribution of any physical attribute. Conversely, H. Dalton argues that this analogy is fallacious. He asserts that economists prioritize the influence of income distribution on overall economic welfare rather than the actual distribution itself (Dalton, 1920a). Nevertheless, it is an undeniable reality that, while economists prioritize its influence on welfare, precise evaluations of inequality are crucial for making appropriate judgments in this context. Within this framework, this section of the research will initially focus on the visual representation and quantification of the distribution of income. It will subsequently delve into various indicators of inequality, such as coefficient of variance and variation, range measure, logarithmic standard deviation, Lorenz curve, Gini index, Kuznets coefficient, general entropy criterion, Dalton criterion, and Atkinson index.

5.1. Graphical Representation

A direct statistical method to describe income distribution in a country is by dividing the income range into multiple classes based on the averages of frequency distributions. This method shows the relative proportions of individuals or households that fall into each of these classes. Furthermore, it is advantageous to create an additional frequency distribution that displays the relative fraction of the total revenue produced by individuals within various income categories. Figure 2 depicts the graphical representations of these two categories of frequency distributions (Sundrum, 2003).

Figure 2 Frequency Distribution and Graphical Representation of Income Distribution



Source: (Sundrum, 2003)

At the intersection of these two curves, the proportion of economic units is equivalent to the ratio of their earned revenue. The proportion of individuals earning below the average income (μ) is denoted by p , whereas the proportion of individuals earning above it is denoted by q . Area A denotes those with incomes below the mean, whereas Area B depicts those with incomes above it.

The Lorenz curve, which is analyzed separately, serves as another illustration of graphical representation.

5.2. The Range Measure

This is the most basic approach to measuring inequality. Here, the income discrepancy between the lowest and highest incomes is quantified, enabling the analysis of the gap between the poorest and wealthiest individuals and its fluctuations over time. If the disparity diminishes, the inequality is reduced; if it amplifies, the inequality is expanded. Nevertheless, this

approach fails to take into account the underlying causes of the disparity and neglects to tackle the gap between the richest and the most impoverished areas, hence attracting criticism.

Another measure of range is defined as $\frac{Y_{max}-Y_{min}}{\bar{Y}}$, where Y_{max} represents the maximum income, Y_{min} indicates the minimum income, and \bar{Y} denotes the average income. As the disparity between the highest and lowest income diminishes, the ratio tends towards zero, signifying a reduction in inequality. Nevertheless, this criterion is subject to criticism for disregarding the frequency distribution of income across the entire spectrum.

5.3. Relative Mean Absolute Deviation

This approach involves comparing all income levels in the distribution to the mean income. Hence, it is expressed as $RMD = \frac{\sum_{i=1}^n |\bar{Y} - Y_i|}{\sum_{i=1}^n Y_i}$. As the ratio increases, there is a corresponding increase in income distribution inequality. Conversely, as the ratio approaches zero, it indicates an improvement in inequality. This criterion is subject to criticism for its lack of sensitivity to income transfers between individuals both below and above the average (Allison, 1978, p. 868).

5.4. Coefficient of Variance and Variation

The coefficient of variance considers the influence of income transfers on inequality. The coefficient of variance is determined as $V = \frac{\sum_{i=1}^n (\mu - Y_i)^2}{n}$, where μ represents the mean and Y_i represents the income of the i -th household. This criterion remains unaffected by the average income level and is not employed to compare two distributions with markedly distinct means. The coefficient of variation is a measure that highlights relative variation and is calculated as the ratio of the standard deviation to the mean. As the coefficient approaches zero, the level of income distribution inequality diminishes. The coefficient of variation is responsive to income transfers at all levels and, unlike the variance coefficient, is unaffected by the average income level. Nevertheless, when there are significant disparities in income, using it as a measure may not adequately capture the impact of transfers.

5.5. Logarithmic Standard Deviation

The logarithmic standard deviation is calculated by taking the logarithm of income levels and formulated as $L = [\sum_{i=1}^n (\log \mu - \log Y_i)^2]^{1/2}$. This

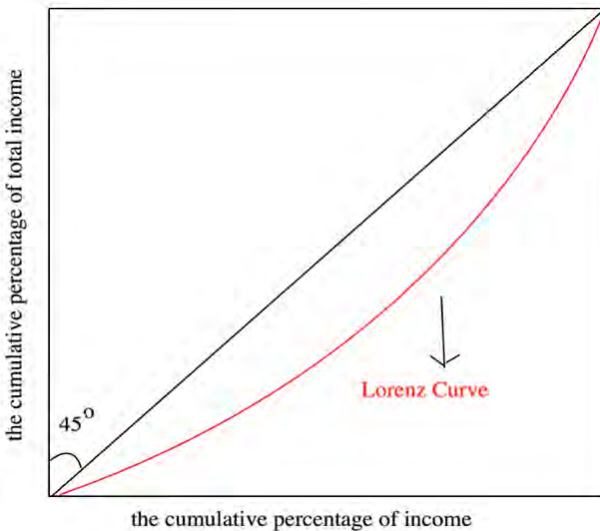
criterion, being logarithmic, gives more weight to lower-income groups. In the case of a transfer from higher to lower-income individuals, the value of the equation decreases. This measure can be used in international and temporal comparisons due to its independence from measurement units.

5.6. Lorenz Curve

This criterion is widely accepted and visually depicts the distribution of income. As illustrated in Figure 3, the Lorenz curve illustrates, along the horizontal axis, the cumulative percentage of income for units arranged in ascending order of size, while the vertical axis represents the cumulative percentage of total income earned by households.

The line that is inclined at a 45-degree angle symbolizes complete and total equality. When one individual owns the entire income, it leads to the curve descending to the maximum distance away from the diagonal (Morgan, 1962). Real curves are positioned between the diagonal and have at least an equal relationship. As the curve converges towards the line of perfect equality, there is a drop in income disparity in the distribution of national income. Conversely, as the curve diverges from the line, income inequality grows. The Lorenz curve is employed to assess disparities in income distribution across various time periods within a single country or among different countries (Aktan & Vural, 2002b).

Figure 3 Lorenz Curve



5.7. Gini Index

The Lorenz curve offers a geometric perspective, whereas the Gini coefficient is a numerical measure of inequality. The index quantifies the proportion of the area enclosed between the line of absolute equality and the Lorenz curve, and it ranges from zero to one. A score close to one signifies an escalation in inequality, whereas a value close to zero signifies a reduction. The Gini index can be computed using three methods: for the overall population, subpopulations, and groupings. Let P represent the population, y_i ($i=1, \dots, n$) indicates the number of units earning income, G denotes the Gini index, and P_j ($j=1, \dots, k$) demonstrates the subpopulation units of P. The Gini indices are expressed as follows (Mussard et al., 2003):

$$\text{Gini index of Population P: } G = \frac{\sum_{i=1}^n \sum_{r=1}^n |y_i - y_r|}{2n^2 \mu}$$

$$\text{Gini index of subpopulation } P_j: G_{jj} = \frac{\sum_{i=1}^{n_j} \sum_{r=1}^{n_j} |y_i - y_r|}{2n_j^2 \mu_j}$$

Inter-group Gini index (Calculating inequality between P_j and P_h groups):

$$G_{jh} = \frac{\sum_{i=1}^n \sum_{r=1}^n |y_{ji} - y_{hr}|}{\mu_j + \mu_h}$$

Income transfers between income groups have a significant impact on the Gini coefficient. Although it is an objective measure, it fails to consider the concentrations of wealth at both the lower and upper ends of the income spectrum. Different dynamics are at play in lower and upper income groups in reality. The Gini coefficient's failure to account for this aspect diminishes its appeal from a tangible standpoint, despite its widespread acceptance as a vital indicator for evaluating inequality (Souma, n.d.).

5.8. Kuznets Coefficient

It is a sector-based criterion for the Lorenz curve. The application is limited to a two-sector economy and the values it can take range from zero to one. If the average of a specific sector is equivalent to the whole economy of the country, then the coefficient will be 0. In this context, the Kuznets coefficient is formulated as $K = Y_i \left| \left(\frac{X_i}{Y_i} \right) - 1 \right|$, representing the employment share of the i -th sector (Y_i) and the production share of the i -th sector (X_i). Usually, the initial sector symbolizes the contemporary (urban/industrial/developed) sector, whereas the second sector signifies the traditional (rural/agricultural/underdeveloped) sector. Based on Kuznets's

(1955) study, the rural region often has a lower per capita average income compared to the urban sector. Furthermore, in the context of the distribution framework, there is a lower level of inequality in the rural region as opposed to the urban zone (Anand & Kanbur, 1993).

5.9. General Entropy Criterion

Contemporary methods for measuring income distribution rely on the notion of entropy in information theory (Frenken, 2007; Hart, 1971). Entropy measurements are valuable tools for quantifying the diversity of distributions at certain time points and studying evolutionary processes throughout time (Frenken, 2007).

Three broad entropy measures exist: Theil, Hirschman-Herfindahl, and Bourguignon decompositions. These measures are all decomposable inequality measurements. The decomposable inequality measure refers to the process of breaking down the overall inequality of a population into two components: the average disparity within existing subgroups of the population, and the inequality between these subgroups. The Theil decomposition is a key approach among generic entropy measures. It is used to assess the inequality within a population and identify the underlying causes of inequality. The Theil decomposition yields values ranging from zero to infinity (Bourguignon, 1979). Under the assumption of diminishing marginal utility of income, a transfer among those with low income is more significant than transfers made among those with high income. The Theil index T effectively captures and highlights this disparity, showcasing its superiority over alternative indices (Allison, 1978).

The universal entropy measure is expressed as $I_{\beta} = \frac{1}{\beta(\beta+1)n} \sum_{j=1}^k \sum_{i=1}^{n_j} \frac{y_{ji}}{\mu} \left[\left(\frac{y_{ji}}{\mu} \right)^{\beta} - 1 \right]$, where β is a real value. The distributional sensitivity varies depending on the value of the β parameter in the range $(-\infty, +\infty)$. When β takes a large and positive value, the index is sensitive to changes in the distribution affecting the upper tail, while it becomes sensitive to changes in the distribution affecting the lower tail when β takes a negative value (Cowell, 2003). Decomposable measures are named according to the value approached by β in the limit of this general formulation. Thus, when $\beta \rightarrow 0$, it is the Theil index; when $\beta \rightarrow 1$, it is the Hirschman-Herfindahl index, and when $\beta \rightarrow -1$, it is the Bourguignon index. The formulations of these indices are as follows (Mussard et al., 2003):

$$\text{Theil Index: } \lim_{\beta \rightarrow 0} I_{\beta} = T = \frac{1}{n} \sum_{j=1}^k \sum_{i=1}^{n_j} \frac{y_{ji}}{\mu} \log \frac{y_{ji}}{\mu}$$

Hirschman-Herfindahl index: $HH = \lim_{\beta \rightarrow 1} I_{\beta} = \frac{1}{2n} \sum_{j=1}^k \sum_{i=1}^{n_j} \frac{y_{ji}}{\mu} \left(\frac{y_{ji}}{\mu} - 1 \right)$

Bourguignon index: $B = \lim_{\beta \rightarrow -1} I_{\beta} = \log \mu - \log M_g$, where M_g is geometric mean of P.

5.10. Dalton Criterion

Dalton (1920) presented a normative evaluation of inequality measurement (Atkinson, 1970). He believes that the distribution issue should be addressed directly as a social welfare function. It is postulated that a predetermined amount of revenue is divided among a group of n persons, and the overall social well-being is determined by adding up the utilities of each individual. The criterion evaluates equality by examining the ratio between actual social benefit and maximum social welfare. Dalton proposes that when income increases, an individual's marginal economic welfare decreases, indicating that their utility can be expressed by a concave function. He asserts that when income increases, the marginal economic wellbeing of each individual decreases. The concave utility function results in a rise in total welfare when income is transferred from the rich to the poor, because the gain of the one being transferred is greater than the loss of the one making the transfer. In this scenario, where all incomes are equal, the social welfare is maximized and is represented by the symbol $nu(\mu)$. The Dalton inequality measure, denoted as D, is formulated as $D = 1 - \frac{\sum u(y_i)}{nu(\mu)}$, where $u(y_i)$ represents the utility derived from income for the i-th individual.

The measurement is criticized for ignoring utility distribution, concentrating exclusively on overall welfare, and critically relying on a particular form of the assumed utility function. Indeed, the utility function does not remain unchanged even when subjected to basic positive linear transformations. Consequently, Atkinson has put up an alternate metric (Sundrum, 2003).

5.11. Atkinson Index

This index is another measure of normative inequality. The criterion, established by (Atkinson, 1970), is represented as

$$AI = 1 - \left[\sum_i \left(\frac{y_i}{\mu} \right)^{1-\epsilon} f(y_i) \right]^{1/(1-\epsilon)}$$

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An increase in ϵ signifies a corresponding decrease in the weight assigned to transfers at the upper end of the distribution relative to those at the lower end. The parameter " ϵ " represents the society's responsiveness to transfers at various income levels, thereby measuring the degree of aversion to inequality.

PART II

POVERTY ANALYSIS

II

POVERTY ANALYSIS

The top priority on a global level, as outlined in the Millennium Development Goals and the subsequently adopted Sustainable Development Goals, is the eradication of poverty worldwide. Embracing a societal viewpoint, particularly in the context of economic progress, involves effectively tackling poverty in all its aspects. Therefore, employing a human-centered strategy in the battle against poverty will also facilitate the complete engagement of the underprivileged in economic, social, and political spheres. This approach encompasses the creation and implementation of policies that directly impact their lives. A holistic approach to address poverty involves implementing policies that foster a fairer allocation of income and wealth, including the extension of social security coverage (United Nations, n.d.).

There are other variables that might be mentioned as contributing to poverty. Numerous factors, including but not limited to wars and conflicts, lack of access to clean water, inequity, malnutrition, absence of social security networks, climate change, and inability to obtain education and healthcare services, exert substantial influence on poverty and are reciprocally influenced by it (Concern, 2022). Furthermore, it is crucial to highlight that certain countries and regions experience deepening poverty due to various factors. These factors include demographic changes, low or negative levels of economic growth, escalating and intensifying migration movements, the influence of technological changes on the labor market, the inefficiency of macroeconomic policies, lack of human capital, inadequate governance, deunionization, and globalization (Ajakaiye & Adeyeye, 2001; Corbett, 2013).

When discussing the factors contributing to poverty, they are typically categorized into behavioral (arising from human actions), structural (related to demographic structure and the labor market), and political (including power dynamics and institutions) theories (Brady, 2019). The reasons of poverty are multifaceted and can be attributed to individual, cultural, structural, economic, political, social, geographical, and cyclical factors (Addae-Korankye, 2019).

The initial step in poverty analysis involves precisely defining poverty and identifying individuals who fall under the category of being poor. The next part will encompass the definitions and classifications of poverty, techniques for calculating poverty, and ultimately, strategies for addressing poverty.

1. Definition of Poverty

Poverty, in its most basic form, refers to the state of lacking essential elements for survival. The impoverished individuals, even under ordinary circumstances, are unable to sufficiently provide themselves with food and clothing, so exposing themselves to the peril of mortality. Although extreme poverty persists in many regions, governments that have attained better levels of general prosperity would consider this definition to be unacceptable (MacPherson & Silburn, 2002).

As per the welfare school concept, poverty is present in society when one or more individuals are unable to attain an economically acceptable minimum, which is viewed as the societal standard. The concept of poverty is taken from modern microeconomic theory and is based on the hypothesis that individuals seek to maximize their own welfare. There is a debate suggesting that the government should limit its involvement in the economy because individuals are more capable of determining their own best interests. This strategy advocates for improving productivity, increasing work opportunities, and boosting income levels as measures to address poverty (Asselin & Dauphin, 2001).

Basic needs, on the one hand, include meeting a certain minimum level of consumption needs of individuals/households (food, shelter, etc.) while also providing necessary services for the whole society (transportation, health, etc.). It should not be forgotten that the basic needs approach is country-specific and exhibits a dynamic structure that changes over time. Especially in developing countries, economic growth should be accelerated and the growth path should be changed, social structure should be transformed, and access to productive resources should be ensured by those in the lowest income group. It is important to consider a nation's overall

economic and social development when assessing its basic necessities. Beyond guaranteeing a minimum standard of living, basic needs should take into account an individual's dignity and their ability to participate in decision-making processes that will impact their lives (International Labour Organisation, 1977).

Under the traditional 'basic needs' strategy, traditional essential goods and services encompass nourishment, water, infrastructure, garments, housing, fundamental education, healthcare, and public transportation. As evident, these needs beyond the fundamental prerequisites for survival. The essential requirements for survival are merely sufficient nourishment, housing, and attire. It is important to acknowledge that the definition of "sufficient" will differ based on factors such as age, gender, and an individual's amount and nature of physical activity. This consideration is necessary before discussing the sufficiency of basic goods (Asselin & Dauphin, 2001).

The classical definition of poverty can be framed as the inability to access basic consumption needs or the income level required to satisfy them. An individual, household, or community that lacks the resources to meet basic needs can be characterized as poor. Consumption-based measures of poverty are related to the physical dimensions of well-being. The inability to access the minimum consumption standard to meet basic physical criteria is often expressed as absolute poverty or deprivation (May, 2001).

Following extensive research conducted in the 1970s and 1980s, the differentiation between individuals living in poverty and those who are not has been effectively established based on measurable factors such as limited resources or substandard living conditions. An alarming consequence of these issues is the categorization of distinct populations as impoverished, due to varying methodologies and indices of poverty. While several methodologies may yield distinct representations of poverty, none of these representations holds superiority over the others. Thus, it is imperative to assess poverty through direct, indirect, and subjective measurements, including diverse indicators and offering supplementary insights into different facets of poverty. The "multidimensional" technique has become increasingly popular in poverty studies due to its effectiveness (Moisio, 2004).

A one-dimensional approach on poverty that is focused on economic wellbeing measures the standard of living using a single monetary indicator, such as income or spending. The multidimensionality of poverty—which takes into account aspects like health, education, and family dynamics—has a stronger correlation with the degree of well-being

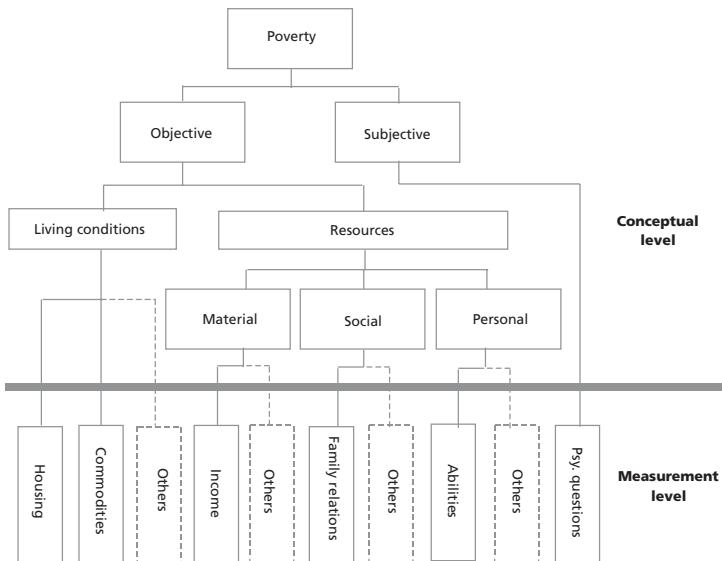
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of an individual or household. In order to talk about multidimensional poverty, it is important to determine and weight poverty indicators correctly (Bellu & Liberati, 2005).

The initial choice is whether we see poverty as a subjective or objective occurrence during the process of quantifying it. Several academics contend that subjective sensations serve as either a satisfactory or essential measure of one's poverty status. The inquiry "Are you poor?" would serve as a reliable gauge of poverty if there were a universal consensus on the factual criteria used and a shared idea of an adequate standard of living. Regrettably, within the realm of poverty study, there exists a divergence of perspectives regarding the definition of an adequate level of living conditions (Moisio, 2004).

Table 1. Poverty



Source: (Moisio, 2004, p. 38)

Relative poverty is the state in which a person is deprived of a portion of the median or average income of the society in which they reside, as opposed to absolute poverty, which is defined as the deprivation of the most basic resources required for survival (Wagle, 2002). The concept of poverty has shifted from being based on absolute measures to being based on relative measures. Additionally, the poverty threshold has altered its

focus from basic biological needs to income levels. Nevertheless, the assessment of poverty has remained unaltered and persists in being quantified as a deficiency in tangible assets (Moisio, 2004).

Just as the notion of "development" changes with time, so does the definition of poverty. Lemanski (2016) in Table 2 emphasizes how the concept of poverty has changed throughout time, starting with its economic foundation. In this instance, international organizations' recommendations and decision-making procedures must also be considered.

Table 2. Different definitions of poverty according to approach, emphasis and institutional application over the last 50 years

Poverty approach	Period	Sectoral Emphasis	Institutional Application
Economic deficiency	1960s to 1970s	Economic	World Bank poverty lines MDG indicators
Basic Needs	1970s and 1980s	Physical and material	ILO's basic needs approach MDG indicators
Multidimensionality	1990s to present day	Physical, material, social and political	World Bank(2000) World Development Report
The poor as experts	1990s to present day	Participation	World Bank "Voices of the Poor Initiatives
Capabilities	1990s to present day	Institutional	UNDP Human Poverty Index (later Multidimensional Poverty Index

Source: Lemanski (2016, p. 5)

1.1. Absolute and Relative Poverty

Absolute poverty is defined as the percentage of the population whose income or spending falls below a specific threshold (known as the poverty line) when adjusted for differences in purchasing power between different socioeconomic groups and over time. Absolute poverty refers to the state of living below the minimum threshold of socially acceptable living conditions, which includes meeting nutritional needs and having access to essential necessities (Lok-Dessallien, 1999).

Absolute poverty is an approach that establishes the essential requirements for human survival and perceives poverty as complete deprivation. Poverty is characterized as the state of lacking the financial means to acquire

essential necessities for survival, such as food, clothing, and housing. Put simply, persons or households lacking the requisite means to afford such a collection of goods and services are classified as "poor" (Awad & Israeli, 1997).

When poverty is defined as a criterion for survival, it typically encompasses the minimum intake of food calories, the minimum set of consumable commodities, the level of individual well-being, or the money necessary to achieve a basic standard of living. Although income, consumption, and prosperity may appear distinct, they are interconnected and directly pertain to goods and services. It is truly difficult to determine the quantity of personal benefit and well-being that a person requires for a minimal standard of living because non-consumption goods, such as leisure time, social interaction, and human capital, have no upper bound (Wagle, 2002, p. 156).

The advantages and disadvantages of this approach are enumerated below (Awad & Israeli, 1997).

Advantages:

1. The updating system for the basic consumption basket is quite straightforward and relies on fluctuations in the cost of living index.
2. Facilitates the precise estimation of the expenses associated with the planned initiative aimed at enhancing the financial conditions of individuals and households experiencing economic hardship.

Disadvantages:

1. The composition of the fundamental basket is established by professionals such as sociologists and economists, but there is a lack of agreement among them.
2. The composition of the basket is determined by various factors, including the social support system, as well as economic, social, and demographic aspects. This ensures that the basket encompasses the consumption habits in each country. International comparisons are hindered by the lack of a universally accepted and standardized basket.
3. Periodic updates of the basket are required based on macroeconomic and social changes in society.

4. In response to shifts in income disparities, the composition of the basket is insensitive.

At its core, "absolute poverty" refers to a state of lacking the basic resources necessary for survival, representing the most fundamental level of economic well-being. The determination of what qualifies as necessary is subject to rather arbitrary criteria, as it is closely linked to the overall quality of life. There exists considerable divergence of opinion regarding the fundamental elements required for survival. Although certain elements do require physical, social, political, and economic resources, others may prove difficult to quantify (Wagle, 2002, p. 156).

The definitions rooted in the notion of absolute poverty enable the depiction of the observed fluctuations across time. The threshold of absolute poverty is determined by essential factors, including a defined daily minimum calorie intake, the percentage of income allocated to food expenses, and the percentage of income required to purchase a basic food basket of essential products, among others (MacPherson & Silburn, 1998).

When poverty is defined in a relative manner, it is determined by not only an individual's income, but also the income of others in the society. Given the disparities in living standards across different societies, which are determined by factors such as average income or a portion of the average, or the lowest segment of income/employment distribution, it is necessary to modify the poverty lines accordingly (Wagle, 2002).

Relative poverty encompasses inequality by comparing the income or spending of the poor to that of the rich or another reference group. Absolute poverty is determined by a specific amount of per capita real income or expenditure, while relative poverty identifies other social groupings based on their real per capita income or spending (Warr, 2000, p. 4).

The advantages and disadvantages of the relative approach are outlined below (Awad & Israeli, 1997, p. 7).

Advantages:

1. Considerations are made for variations in income disparity, tax structures, transfer payments, and population expansion within the market.

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2. Enables the researcher to establish a poverty threshold for each individual and country, thereby simplifying cross-national comparisons.

Disadvantages:

1. The establishment of the poverty line is considered arbitrary due to its determination as a certain percentage range of income distribution.
2. Does not account for the impact of disparities in overall inequality or poverty levels among countries when evaluating differences between countries.

As a first indication of inequality, relative poverty compares the income distribution of the nation's citizens with the income of an individual or household. It refers to the lowest amount of income required for an individual to maintain the average standard of life in the society under examination because it is context-specific. As a result, relative poverty differs between nations and regions. The cost of the basket containing the bare minimum of basic commodities can be used to compute absolute poverty using two different methods: food and non-food indicators (Touray, 2016).

Poverty can be observed from both an absolute and a relative perspective. Amartya Sen has well elucidated the dual nature of poverty, wherein poverty is an absolute concept in relation to the definition of capacities, but it is relative in terms of products and their attributes. For instance, households that are unable of acquiring the necessary sustenance for survival are considered to be in a state of absolute poverty. Nevertheless, the price and content of this nourishment will range among various demographics, areas, or families in distinct nations (Lok-Dessallien, 1999). In a similar vein, O'Boyle (1999) emphasizes that poverty is neither absolute nor relative, but can be both, since the individual's unmet physical needs are two-dimensional.

Compared to absolute poverty, relative poverty is more persistent and less impacted by economic growth. Redistributive fiscal policies and inclusive social security programs are two methods used to fight relative poverty. Along with implementing such plans into effect, they ought to guarantee harmony and social cohesion (R. Walker & Lichao, 2020).

1.2. Objective and Subjective Poverty

The objective perspective includes "normative judgments" regarding the definition of poverty and the necessary measures to alleviate individuals from their impoverishment. The subjective method, which prioritizes individual utility, examines the extent to which individuals assign value to services and goods, as well as their preferences towards them (Lok-Dessallien, 1999).

If poverty is regarded as an objective fact, then low resources and inadequate living conditions might be viewed as manifestations of poverty. Resources are categorized into three types: material, social, and personal. The scarcity of financial resources is quantified in terms of disposable income. Although social and personal resources, such as family relations or health, are rarely extensively utilized in poverty studies, they significantly influence an individual's overall well-being. This could be attributed to the absence of dependable data encompassing details of social and personal resources. Revenue and other material resources can be collected and accessible more efficiently (Moisio, 2004, p. 38).

Economists typically choose an objective methodology due to the numerous challenges associated in incorporating individual advantages within a society. Advocates of this method contend that individuals may not possess the ability to consistently determine what is most advantageous for themselves. For instance, numerous poverty assessment frameworks prioritize the evaluation of food accessibility. While all individuals have the ability to assess their food intake, some may prioritize specific types or amounts of food, even if they are not optimal for their physical health (Lok-Dessallien, 1999).

The subjective poverty approach evaluates the income, consumption, or well-being levels that are regarded essential to prevent being classified as poor, using public research and surveys. Participants are required to assess these levels using the terms "inadequate," "adequate," or "excellent." These reviews aim to establish poverty standards that prioritize income and well-being. Subjective poverty standards, although they may seem useful in accounting for cultural and other variations in needs, face criticism due to their intrinsic lack of comparability across time and between different countries, as well as the reliance on inaccurate survey data (Wagle, 2002, p. 158).

The core assertion of the subjective approach is that individuals' self-perception of poverty determines their poverty status, and the most effective means of ascertaining this is by inquiring about the income level linked to this impression. The crucial aspect of this technique lies in

ensuring that individuals give identical significance to the selected terms (such as good, terrible, insufficient) in the survey and possess the ability to assign a monetary worth to these phrases. Especially in the context of global study, it might be difficult to acknowledge these assumptions due to the complexities of translating the concepts of "good" and "bad" across different languages (Phipps, 1993, p. 314).

The advantages and disadvantages of the subjective approach are outlined below (Awad & Israeli, 1997).

Advantages:

1. Estimation of minimum income is achieved by individuals perceiving their own situation based on the socio-economic environment in which households live.
2. The determination of the poverty line is individual-focused and is also specific to the general population.

Disadvantages:

1. Questions in household income and expenditure surveys generally do not consider self-assessments of households regarding their own situations, leading to variations when these questions are observed, hindering international comparisons.
2. There is an implicit and emphasized assumption that there will be no significant differences in thought among household members regarding the required minimum income.

A prolonged controversy has existed in the study of social indicators regarding the comparison between objective and subjective methodologies. The objective method emphasizes the quantification of "hard" data, such as income in monetary units or living area in square meters. Conversely, the subjective method focuses on subjective aspects, such as the level of satisfaction obtained from money or the perceived sufficiency of housing (Veenhoven, 2007).

1.3. Capability Approach to Poverty

The notion of "human capability" within the context of poverty centers around enhancing individuals' prospects and assessing both tangible and social forms of deprivation. The "human capability" approach, which focuses on empowering the poor, facilitating their inclusion in society, and

promoting upward social and economic mobility, is central to measures aimed at reducing poverty (Lok-Dessallien, 1999, p. 4).

The capabilities approach goes beyond material deprivation and includes people's capabilities and gaining self-esteem in a given society (Chambers, 2006). Additionally, individual choices and freedoms are encouraged (Osmani, 2016) while the integration of economic, social, and cultural life is taken into consideration for evaluating the capabilities required for both physical and economic functionality (Hammill, 2009). Actually, this strategy highlights that rather than emphasizing economic growth, the goal of development is to expand individual capacities (skills, etc.) overall (Clark, 2005). Thus, the positive impact of capabilities that will activate the structural transformation in society is highlighted, beyond the quantitative growth numbers that are necessary but not sufficient for economic development.

Capability poverty refers to the lack of fundamental human capabilities required to achieve a satisfactory level of functioning in a society. The main focus is on ensuring that persons have the chance and ability to live a lengthy and healthy life, possess literacy skills, and actively engage in their communities (Lok-Dessallien, 1999, p. 11).

Capability poverty is a concept that distinguishes between the poor and non-poor by considering factors outside their income and consumption abilities. An individual's capacity can span multiple dimensions, such as education and health, and has a significant impact on well-being, including the ability to generate the necessary revenue to enhance the consumption of goods and services. Sen argues that having a comparative understanding of things such as "death rate, disease rate, malnutrition, etc.," is more important than money or riches. These elements fluctuate depending on the development stages of nations (Wagle, 2002, p. 158).

Welfare economics primarily concerns itself with the resources needed to attain a satisfactory quality of life, specifically consumer goods and services, as well as the resources essential for their production, without considering any additional factors. Sen argues that the significance of these things lies not in their inherent value, but rather in the abilities they provide humans and the potential to produce goods and services through these talents. The abilities an individual can develop from commodities and services are contingent upon the criteria that define the methods by which this conversion can be accomplished (Robeyns, 2005, p. 36):

1. Social Transformation Factors
 - Social Institutions (family, education system)
 - Social Norms (cultural, moral norms)
 - Traditions
2. Environmental Transformation Factors: Determined by the environment in which one lives.
3. Personal Transformation Factors: Determined by the individual's mental and physical characteristics.

The concept of deprivation of capabilities refers to the condition of lacking the fundamental capacities required to live a dignified life. The social exclusion approach focuses on the social, political, and economic factors that impede individuals from feeling a sense of belonging and participating fully in society (Yuncu, 2005, p. 1). The capabilities approach is about what the individual can actually do or be. It does not focus only on income or consumption level, but on the well-being and quality of life of the individual (M. Walker, 2005) .

1.4. Chronic and Transitory/Transient Poverty

Poverty can manifest as either chronic, persisting over a long period of time, or temporary, lasting just for a short duration. Transitory poverty arises from oscillations in welfare caused by a singular decrease in living conditions (households progressively comprehend this) or several reductions in living conditions falling below the poverty threshold. Households can be driven into poverty by external shocks, such as natural catastrophes. When previously non-impoverished households encounter poverty for the first time, it becomes difficult to ascertain if their experience is temporary or chronic.

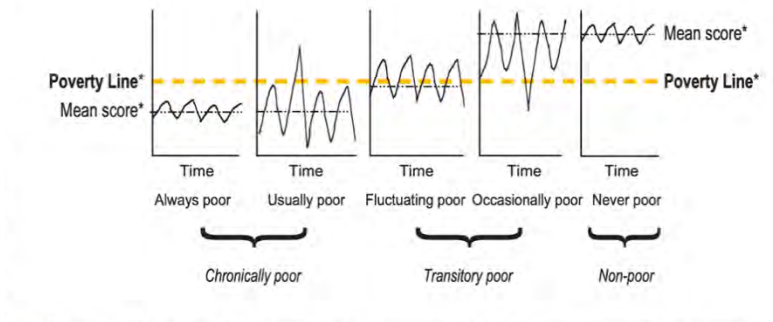
It is insufficient in theory and practice to assess chronic poverty solely through monetary measures. These indicators are susceptible to offering a deceptive portrayal of the poverty dynamics of households and populations (Hulme & McKay, 2005, p. 28).

Chronic poverty does not emerge as a result of a single factor. It can arise as a consequence of the combination and intersection of material poverty, extreme capability poverty, and vulnerability. The Chronic Poverty Report 2008–2009 highlights five primary factors that lead to the ongoing

existence of chronic poverty, sometimes refers to as poverty traps. The traps encompassed in this context comprise of issues such as insecurity and deteriorating health, war and violence, economic and political marginalization, environmental and geographical elements, as well as social prejudice (Prowse, 2009).

Figure 4 illustrates how temporary and chronic poverty varies over time and the situation of the non-poor as a poverty classification based on a given poverty line.

Figure 4 Poverty classification



Source: Chronic Poverty Research Center 2004, p. 5

Chronic poverty actually means experiencing deprivation for many years as well as the intergenerational transfer of poverty. Chronic poverty results in a weakening of the link between an individual's ability to fully integrate into society and economic growth and income-generating capabilities over generations. In fact, the existence of this situation is determined by the structure of the social and political system in the society examined (Punton & Shepherd, 2015; Vakis et al., 2016).

Chronically poor individuals are not a homogeneous¹ group; it can affect people in many different circumstances. Various reasons for chronic poverty vary from region to region, household to household, and person to

¹ Even those who are economically active, lack access to adequate financial and social resources, are at increased risk, rely on others for financial support, work in low-quality, insecure jobs, or face social discrimination may experience chronic poverty (Chronic Poverty Research Center, 2011). Besides, the main causes of chronic poverty, including economic, social, political, and environmental factors, were categorized by Hulme et al. (2001).

person due to different sets of accompanying factors (Chronic Poverty Research Center, 2004, p. 7).

Chronically poor individuals are not just a list of vulnerable groups, but generally individuals who simultaneously experience various forms of disadvantage and discrimination. Different combinations of structural factors (labor and product markets, race, gender, region, class, geographic location), life cycle factors (household size, age), and specific factors (natural factors, theft) can create and perpetuate poverty, offering some the opportunity to escape or hide from poverty (Chronic Poverty Research Center, 2004, p. 7).

Over the past few decades, there has been a shift in the understanding of poverty, recognizing its complex characteristics. Although the importance of the extent and seriousness of poverty is acknowledged, there has been a sluggish advancement in detecting and tackling the persistence of poverty over time, often known as chronic poverty. Poverty persists as a highly difficult circumstance for numerous individuals, frequently manifested as a state of deprivation transmitted over generations (Hulme & McKay, 2005, p. 1).

1.5. Vulnerability to Poverty

To initiate the development of a poverty profile, it is essential to analyze the attributes of various consumer or socio-economic income categories within the nation. This offers vital insights on the demographics of poverty and the disparities between individuals living in poverty and those who are not. Furthermore, it is imperative to incorporate not only the identities of the impoverished individuals, but also comprehensive data regarding their residential location, behaviors, health, education, nutrition, housing, and other pertinent factors that contribute to their overall living conditions. Compiling poverty profile data is crucial for accurately delineating the living conditions of those experiencing poverty. It is essential to develop a poverty profile that takes into account the political, social, and cultural factors of the country. In order to enhance and explain the poverty profile, it is important to apply not just institutional analysis but also historical and qualitative information (Coudouel et al., 2002, p. 36).

The formulation of the process for creating a poverty profile can be outlined as follows, taking into account that the structure and content of the profile should be tailored specifically for each country (Dessallien, 1999).

1. Examining the accessible data on poverty in order to address inquiries such as:
Who constitutes the impoverished population?
What is the geographical location of impoverished individuals?
What are the primary attributes of their impoverished state?
What is the cause of their poverty?
The analysis should categorize the data based on gender and age cohorts.
2. Analyzing poverty patterns in both the immediate and extended periods.
3. This involves examining all aspects connected to establishing the institutional, social, national, and economic structure in relation to poverty, based on the information gathered.

Creating a poverty profile actually shows how the nature of poverty for a given society differs among subgroups of the society. It looks at the differences in poverty by geography, community, livelihoods and household features. Assessing the sectoral or regional pattern of economic transformation that would impact overall poverty requires the use of a well-prepared poverty profile, which offers crucial information. As a result, all factors that are relevant to poverty and required for anti-poverty programs should be considered when establishing a poverty profile. It is necessary to include aspects such as income-generating activities, access to infrastructure and consumption composition for creating a poverty profile. The quality of a poverty profile is contingent upon the reliability and robustness of the data used to build it (FAO, 2021; World Bank, 2014).

While poverty profiles offer valuable insights into the characteristics of poverty, they are not very good at illustrating the reciprocal relationship that exists between various socioeconomic groups and poverty indicators. They do not account for other variables that affect poverty but are not included in the research, which could lead to the implementation of poorly carried out policies (Kakwani & Son, 2005). Although a poverty profile helps to outline the extent of poverty, it does not extensively explore its underlying causes. Poverty can be attributed to several factors at the regional, sectoral, community, household, or individual levels. In summary, these can be classified as Regional Characteristics, Community Characteristics, Household Characteristics, and Individual Characteristics (World Bank, 2003).

Various studies have focused on measuring poverty at both national and international levels. The grounds for measuring poverty are as follows (Coudouel et al., 2002):

- A poverty analysis that provides accurate and precise results can serve as a powerful tool for policymakers to focus their attention on the living conditions of the poor. Neglecting the poor can be easy if they are statistically invisible. Therefore, measuring poverty is necessary for it to be visible on the economic and political agenda.
- Measuring poverty is essential for evaluating policies and programs designed to help the poor and predicting their efficiency. Policies that may look good on paper may not work as well and efficiently as expected when implemented. It also helps in the understanding of the politics surrounding government policies. By collecting information about households and their economic status, it is possible to assess who is using public services and benefiting from government incentives.
- It is necessary for targeting interventions for the poor. Without knowing who is poor, helping them is not possible. Targeting at both the national and international levels is crucial. International institutions, having limited resources, want to know how to distribute these resources to overcome poverty. However, ensuring the correct evaluation of these resources by country leaders is not guaranteed merely by the international distribution of these resources in certain quantities.

Efforts are being undertaken to comprehend and eliminate poverty due to its susceptibility to intervention. The issue of citizens' well-being or lack is tackled by the ability to shape the allocation and magnitude of societal benefit through governmental policies. These persons can receive social transfers and governmental services in the most efficient manner. In addition, social transfers and public services, in their present capacities, not only alleviate existing poverty and inequality, but also serve to inhibit the intergenerational transmission of inequality and poverty (Moisio, 2004, p. 24,25).

Poverty is interconnected with the notions of inequality and vulnerability, while it possesses distinct characteristics from both. Inequality, encompassing the distribution of consumption or income among the entire population, is a term closely linked to distribution. When analyzing poverty, if the analyst feels that an individual's well-being is influenced by

their economic status compared to others in society, it is necessary to investigate inequality. Vulnerability refers to the susceptibility of individuals to the possibility of experiencing poverty in the future. This vulnerability exists even if a person is not now impoverished, as they are often exposed to the potential consequences of many shocks, such as drought, a decline in agricultural prices, or financial crises. Vulnerability is a crucial aspect of well-being as it impacts the individuals' behavior, including their investment choices, production patterns, and coping mechanisms, as well as their personal circumstances (World Bank, 2005b). Certain demographic groupings, such as those affected by gender, color, or family structure, may be more susceptible to the danger of poverty. Simultaneously, poverty can be highly associated with different combinations of vulnerability, such as households headed by women or households residing in isolated mountainous areas (Lok-Dessallien, 1999).

In reality, vulnerability is a state that suggests whether a household is likely to experience poverty at least once in years to come. Accurately calculating vulnerability to poverty may actually lead to differentiation of target groups of poverty and social insurance programs. Decisions on who to target (always poor, persistently poor, etc.) may also be erroneous if the vulnerable are not appropriately identified. Furthermore, policy makers should consider that in societies where there is a higher proportion of individuals at risk of poverty, these groups may also be more vocal in their demands for political and economic changes aimed at lowering the risk (Pritchett et al., 2000).

The key distinction between vulnerability and poverty stems from the "existence of risk". Despite the fact that there are numerous causes of uncertainty, macroeconomic shocks and a decline in the ability to generate income might make a person more vulnerable to poverty in the long run. In the future, vulnerabilities will be crucial for effective anti-poverty programs. Poverty reduction will also be encouraged by the creation of policies that specifically address vulnerabilities (Chaudhuri, 2003; Gallardo, 2018).

Poverty is the state in which persons who have insufficient income are unable to access the goods and services necessary to sustain their everyday life, in comparison to other members of society. When an individual is unable to derive as much or any advantage from these goods and services compared to others in society, it indicates a state of inequality. According to this definition, poverty and inequality are distinct concepts, yet it is important to analyze the total distribution of wealth and social disparity in order to completely understand poverty (Erdem, 2003, p. 136).

2. Fundamental Factors of Poverty Analysis

Whether conducted at the national or international level, achieving consistent and comparable results in poverty studies requires similar definitions and methods. The selection of the unit of analysis can lead to different interpretations of the number and depth of the poor. The fundamental factors underlying poverty studies include:

1. Data source and selection (Household income and consumption surveys)
2. Selection of the unit of analysis (Individual, family, household)
3. The impact of the "equivalence scale" and "economies of scale" in the selection of the unit of analysis
4. Selection of the welfare indicator
 - Monetary and non-monetary indicators
 - Objective and subjective indicators

There are several issues in defining and quantifying poverty. These analysis problems include, among other things, whether the methods chosen are objective or subjective, universal or not, at what level (individual, household) the analysis will be made, how to distinguish the impoverished from the non-poor if poverty lines are used, and the variation in the focus of each method chosen. In reality, the methods used for conceptualization, definition, and measurement matter when it comes to the objectives and policies of poverty reduction. Focusing on one of the approaches will actually lead to ignoring the others and what they involve (Laderchi et al., 2003).

There are criticisms and discussions regarding each of these stages in poverty analysis. It is essential to note that disagreements may arise in the selection of the welfare indicator (consumption or income?, What should be included?, How should it be evaluated?), determining the poverty line (how it should vary over time or sub-population groups, at what average level it should be established), and creating the poverty measure (how it is related to the social welfare function, whether a penalty needs to be applied for inequality among the poor) (Ravallion, 1996, p. 1329).

3. Welfare Indicators

When assessing welfare, different institutional approaches face the challenge of determining suitable indicators. Indeed, the direct observation of economic prosperity, satisfaction of wants, and individual potential is nonexistent. In such situations, it becomes vital to utilize observable variables that enable the portrayal of the concept of "poverty." These factors are sometimes referred to as indicators. The nature of indicators may be either direct or indirect. A direct indicator is one that specifically measures the dimension of poverty it is intended to represent. Conversely, if an indicator of a certain aspect of poverty either influences poverty or is a result of it, then it is considered an indirect indicator. An indicator may serve as a direct measure for an aspect of poverty while functioning as an indirect measure for another aspect (Asselin & Dauphin, 2001).

The evaluation of these approaches can be classified using monetary and non-monetary metrics, as well as objective and subjective ones. When predicting well-being or poverty through monetary indicators, the most commonly used indicators are income and consumption. Emphasis is placed on the fact that poverty has dimensions beyond the monetary aspect that can be measured in terms of non-monetary indicators. With this approach, poverty is considered as a phenomenon beyond having insufficient income and consumption levels. Factors affecting an individual's quality of life, such as inadequate/poor nutrition, illiteracy, lack of access to sufficient medical care, social exclusion, and low self-esteem, are also attempted to be highlighted in relation to poverty.

Various opinions may exist on the appropriateness of using monetary or non-monetary variables in poverty analysis, as well as the respective significance of each. Generally speaking, consumption and income are utilized as monetary indicators. The benefits and drawbacks of both consumer spending and income are compiled in Table 3 in response to the question of whether it is a better indicator. However, the multifaceted nature of poverty and social exclusion may be missed if one focuses solely on money (Nolan & Whelan, 2009). Furthermore, income does not account for an individual's long-term control over different resources (savings, loans, assets, etc.) because it is often calculated at a certain point in time or reference period. Whether the states provide public services is also a factor to consider when calculating income. Relative income metrics are not impacted by broader economic shocks or fluctuations, which lowers living standards but does not result in income poverty (Watson et al., 2017).

Poverty can be measured both objectively and subjectively. The most traditional method involves the use of objective types of poverty measures

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(basic needs, poverty line, etc.). The subjective approach, on the other hand, reflects individuals' or households' own perceptions of their current situation. With this approach, data is collected based on individuals' preferences and perceptions.

Table 3 Advantages and disadvantages of consumption and income aggregates as a poverty indicator

INCOME	
Advantages	Disadvantages
Not too complex to measure, given the limited number of income sources	Likely to be underreported, if not obtained illegally
Lower cost of data collection	Can vary over the life cycle and seasonally, not reflecting welfare
	The links between income and household welfare or utility are not always direct
	Income from informal and home production can be hard to estimate
CONSUMPTION	
Advantages	Disadvantages
Shows the current level of welfare achieved as an outcome	Challenges in valuating rare expenditures in terms of average welfare
Smooths out irregularities, better reflecting long-term average well-being	Lack of access to credit can limit full smoothing both over life cycle and seasonally
Less understated than income, especially for non-wage income	

Source: (UNICEF, 2022)

Over time, there have been significant developments in how poverty is conceptualized. The scope of the analysis is shifting to incorporate non-material variables in addition to income and consumption expenditures, better representing the multifaceted character of poverty. Poverty is now addressed in the context of human rights, on the basis that the individual has a life worth to human dignity. Although various poverty lines and indices, some of which are included in this study, are used for measurement; human development index, multi-dimensional global poverty index, gender development index (UNDP, n.d.) examples reflect this inclusiveness through the dimensions they address (economic, political, education, health, gender equality, participation in decision-making, etc.)

4. Poverty Lines

After identifying the variable to be utilized as the welfare indicator, it becomes essential to establish poverty lines in order to compute poverty

rates. Poverty analysis is to determine the individuals who are experiencing poverty within a given neighborhood, region, or country. In order to accomplish this, it is crucial to differentiate between individuals who are impoverished and those who are not. Poverty lines function as a definitive boundary that distinguishes individuals who are impoverished from those who are not. Individuals and households above this criterion are categorized as non-poor, whilst those that fall below the threshold are regarded as poor.

An individual is considered poor when they lack the ability to exercise authority over fundamental consumption necessities, encompassing both nourishment and non-nourishment elements. The poverty line is derived by establishing a consumption basket that is considered enough to fulfill basic consumption requirements and subsequently calculating the cost of these fundamental needs. Once the household's consumption level has been established, the poverty threshold is employed to determine whether the household falls into the category of poor or not. This threshold acts as a standard for defining household poverty (World Bank, 2005a).

As previously stated, there are discrepancies in the definition of poverty, the levels of poverty individuals experience and the causes of poverty among various countries, regions, communities and even families. The establishment of poverty lines is a basic step in the examination of poverty.

The establishment of poverty lines makes it possible to distinguish between people who are and are not considered to be impoverished. In this situation, poverty lines serve a wide range of purposes, hence establishing them is necessary in order to determine poverty rates. The derived rates of poverty can be used to compare different population groups and provide policymakers with information about changes in poverty to monitor (Lanjouw, 2001).

Poverty rates are significantly dependent on both the selected poverty line and the methodology used in the calculation. Therefore, if different countries have different poverty lines, making comparisons would be challenging and meaningless. To compare poverty rates internationally, similar methodologies should be employed in different countries. In this regard (Yemtsov, 2001):

- How poverty lines are established,
- How household size and needs are measured,

- The accuracy of measuring consumption or income becomes crucial factors.

While establishing poverty lines is one way to measure poverty, there are certain drawbacks to this approach. Both monetary and non-monetary indicators can be used to determine the poverty line. When monetary indicators are employed, it is crucial to develop an accurate basket that can account for both individual and household consumption preferences as well as changes in the monetary indicator over time. Since both of these points are context-specific, it is difficult to make comparisons across countries and over time (Touray, 2016).

When considered at the national level, comparing poverty rates across different regions within a country assists in targeting transfers and determining the best location for development expenditures. To fulfill this task accurately, the poverty line needs to be derived scientifically and objectively. However, all poverty lines carry normative assumptions and an element of arbitrariness to some extent. Therefore, it should be noted that no poverty line is entirely objective.

- Facilitates the identification of the poor in creating a poverty profile.
- Allows monitoring the effectiveness of public transfers aimed at reducing or eliminating poverty and sustains public debate within the poverty framework.
- The impact of stabilization efforts or liberalization policies on the poor can be assessed by examining poverty rates before and after implementation. For meaningful comparisons, the poverty lines used in the comparison should represent the same level of welfare (Lanjouw, 2001).

In summary, the relative poverty line is established by a specific proportion of the distribution of income and/or consumption, whereas the absolute poverty line is really established with a fixed threshold value that stays constant throughout time in real terms. Since the household is the unit of analysis for both absolute and relative poverty lines, any member of the household who is poor is likewise deemed poor. The most popular method for determining absolute poverty thresholds is frequently the cost of basic needs. The food energy intake approach is an alternative that can be utilized in situations where pricing information is not accessible. Absolute poverty lines are typically adopted by low-income nations and represent only what is needed to survive, but relative poverty standards, which are

more prevalent in wealthy nations, are by definition based on the overall distribution and also represent inequality (UNICEF,2022).

The subsequent subsections analyze different approaches used in poverty measurement: absolute poverty, relative poverty, and the basic needs approach. Every viewpoint provides a distinct perspective from which we examine and understand the intricate terrain of poverty and socio-economic inequalities.

4.1. Absolute Poverty Line

The absolute poverty line is established by considering the essential requirements that persons need to maintain their livelihoods. The absolute poverty line is determined based on the minimum consumption demands required for persons to maintain their lives (Gürsel et al., 2000, p. 96). It describes a situation where a household or individual is unable to achieve the essential degree of well-being necessary for survival.

Establishing poverty lines that provide uniformity across various locations and timeframes is crucial for facilitating comparisons at both local and global levels. The absolute poverty lines are unchanging when it comes to measuring poverty levels in relation to the standard of living. Therefore, the poverty limits established maintain consistent purchasing power over several years. Absolute poverty lines are utilized to evaluate the long-term benefits of anti-poverty programs or to determine the impact of implemented schemes, such as microcredit, on poverty. When countries employ different absolute poverty lines, it becomes challenging to make reliable comparisons of poverty rates between them (World Bank, 2005a).

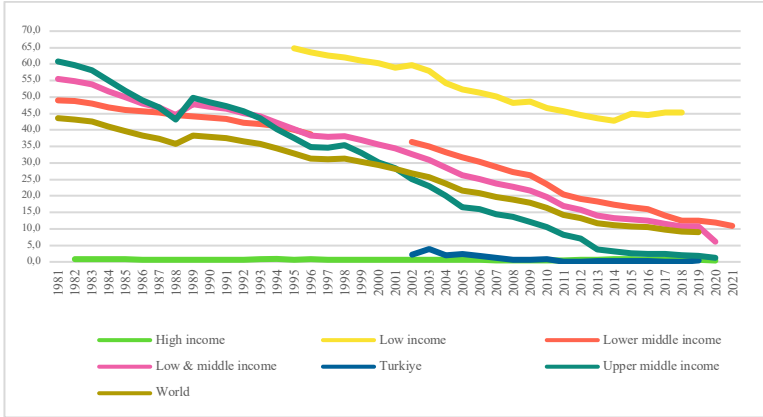
The worldwide poverty line by the World Bank rises over time, mostly due to inflationary pressures on prices. The World Bank has updated the international poverty line in accordance with the introduction of new purchasing power parities (PPPs). The line has been amended from \$1 per day in 1985 PPPs to \$1.08 with 1993 PPPs, then to \$1.25 with 2005 PPPs, and finally to the current \$1.90 line with 2011 PPPs. The World Bank will transition to utilizing the 2017 purchasing power parities (PPPs) for its global poverty figures in the autumn of 2022. This statement refers to the introduction of a new set of purchasing power parities (PPPs) in 2020. These PPPs were calculated using price data acquired in 2017 by the International Comparison Program. Consequently, the designated threshold for international poverty will be set at \$2.15. Consequently, those whose daily income falls below this threshold will be classified as living in extreme poverty (Filmer et al., 2022). Figure 5 displays the poverty headcount ratio at a daily income of \$2.15 in several countries and

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country groups. Globally, while this ratio is decreasing, it remains at approximately 45% in low-income countries.

Figure 5: Poverty headcount ratio at \$2.15 a day (2017 PPP) (% of population)



Source: World Bank

The absence of a comprehensive explanation of the international poverty line in relation to purchasing power parity across different countries and time periods may result in the World Bank's poverty line producing inaccurate estimates. For example, individuals classified as poor may actually have greater access to goods compared to those classified as non-poor. Another critique is that the poverty threshold set by the World Bank does not have a stable value that corresponds to the minimum requirements for basic human needs (Pogge & Reddy, 2003).

In order to calculate purchasing parities for poverty estimates, it is important to prioritize the products that are consumed by individuals living in poverty. Nevertheless, establishing the specific products that are consumed by the poor or the necessary consumption patterns to alleviate poverty is unattainable without initially establishing a clear definition of who falls under the category of being poor (S. Reddy, 2004).

Lanjouw (2001) provides a summary of the several approaches used to establish an absolute poverty line, as presented in the Table 4.

Table 4 Summary of Approaches to Setting an Absolute Poverty Line

Component of the Final Poverty Line	Method	Advantages	Disadvantages
Food Poverty Line	Least-Cost	Identifies the lowest cost food bundle. Does not require detailed expenditure data.	Food bundle may not accord with actual eating habits. Complex—particularly with multiple nutritional minimums.
	Expenditure-Based	Consistent with eating habits of low-income households. More likely that obtaining a caloric minimum implies balanced nutrition.	Requires detailed household-level quantity and expenditure data.
Non-Food Component	Choosing Non-Food Bundle Directly	Straightforward and transparent. Does not require expenditure data.	Arbitrary and paternalistic. Requires price data.
	Scaling Up Food Poverty Line	Reflects behaviour of low-income households.	Requires household level expenditure data.

Source: (Lanjouw, 2001, p. 22)

4.2. Relative Poverty Line

Relative poverty is defined as the condition of an individual whose income and expenditures fall below a defined poverty line compared to the average welfare level of the society to which they belong. Households with income and expenditures below a specified poverty line, when compared to the overall population, are described as relatively poor (Turkish Statistical Institute, 2022a).

The relative poverty line is calculated based on the percentile rank in the welfare distribution. For example, it is estimated as the income or consumption level below which less than 30% of the population falls. The relative poverty line can be determined by selecting either the median or a specific percentage of the mean income. Therefore, poverty is characterized by having resources (such as income or consumption) that fall below a specific percentage of the selected median² or average income. There is no explicit justification for favoring one percentage level over another.

² When median income is taken into account, a poverty line that is determined by distributional factors is produced by exceeding the average value; this leads to the establishment of various poverty lines even among nations that have the same degree of per capita income (Garroway & De Laiglesia, 2012).

Nevertheless, policymakers can utilize different percentage levels (such as 40%, 50%, 60%) as a means of comparison.

The shortcomings of using the relative poverty line are as follows (Lanjouw, 2001):

- When it is necessary to track poverty across time and across different areas, the relative poverty line is not appropriate for this task.
- It lacks the capability to make comparisons across several regions.
- The establishment of the relative poverty threshold is fundamentally arbitrary. The rationale behind defining poverty as a specific percentage point rather than any other percentage point is not evident.

4.3. Basic Needs Approach

The basic needs approach focuses on determining the fundamental expenditures required by individuals to sustain their life, encompassing necessities such as food, clothes, shelter, education, and healthcare (Erdoğan, 2002). The poverty threshold established by this approach is determined as the expense of a collection of standard essential requirements, which fluctuates among various sectors and areas (Dağdemir, 2002).

The notion of basic necessities initially surfaced on a global scale during the 1976 World Employment Conference. At the conference, there was a purposeful avoidance for establishing a universally applicable benchmark for minimal basic needs. Instead, it was emphasized that the concept of basic needs is distinctive to each country and subject to change over time. Moreover, the United Nations Secretariat has established that fundamental needs consist of a comprehensive collection of both tangible and intangible requirements (Weigel, 1986). The essential requirements are as follows (Tekeli, 2000, p. 142):

1. The essential requirements for a family's personal consumption (nutrition, housing, clothing etc).
2. Essential communal services, such as potable water, sanitation, electricity, public transit, healthcare, and education, that are provided for the collective benefit of the community.

3. Inclusion in the process of making decisions that have an impact on them.
4. Fulfillment of fundamental human rights within the larger context of essential necessities.
5. Considering employment as both the objective and the method for fulfilling fundamental needs methods.

The basic needs approach makes sense both from the perspectives of economic development and poverty. Energy, global trade, appropriate technology and consumption practices, environmental preservation, and other issues are all included in the basic needs approach. It makes it easier for political support to be extended, which is needed for the processing and integration of these different areas. According to the basic needs approach, goods and services are met at a certain minimum level as a way of consumers to be satisfied (Paul-Streeten & Burki, 1981). This involves everything from incorporating "essential human rights" into the degree of personal autonomy to involvement in employment. Table 5 provides an overview of the capabilities approach compared to the basic needs approach.

Table 5 Comparison of Basic Needs Approach and Capability Approach

Basic pillars	Basic Needs Approach	Capability Approach
Philosophical foundation	People should achieve minimum subsistence	People should have equal freedom to choose their valued ways of life.
Definition of poverty	Deprivation of consumption	Deprivation of opportunities
Poverty reduction	Ensure adequate access to consumption	Equal opportunity to make choices
Policy objective	Subsistence	Empowerment
Power relationship	Paternalistic	Deliberative
Level of application	Generalized but allows regional diversities	Multiple levels with emphasis on localization

Source: Wong (2012, p. 10)

The primary objective of the basic needs approach is to enhance productivity and guarantee equitable distribution in order to eradicate deprivation resulting from the absence of fundamental commodities and services (Streeten & Burki, 1978, p. 412).

The "Basic Needs Approach" was introduced as a novel development program in partnership with the International Labour Organization (ILO)

at the 1976 World Employment Conference. It distinguishes itself from other approaches by prioritizing the reduction of absolute poverty and the fulfillment of basic human needs (Weigel, 1986).

Challenges faced in implementing the Basic Needs Approach (Streeten & Burki, 1978):

- The content of the basic necessities' basket cannot be determined based on an objective criterion. Although there are specified minimal physical conditions necessary for human survival, the basic demands might vary depending on geographic regions, climates, cultures, and time periods.
- Basic requirements do not exist at a singular level, rather they are organized in a hierarchical structure.
- Enumerating the constituent parts of the basic requirements basket is hindered by certain conceptual challenges. Although all human needs fall within the category of human desires, not all human desires are classified as needs (Weigel, 1986).

5. Poverty Indices

Once the decision is made between using income or consumption variables as the welfare measure, the next step after determining the poverty line is to select the most appropriate index to quantify overall poverty. The prevailing indicators employed for this objective are:

Headcount ratio refers to the proportion of individuals in a certain population or group.

The poverty gap index measures the extent of income inequality among individuals living below the poverty line.

The squared poverty gap index gives more weight to a poor person's observed income as it goes below the poverty level.

The Foster–Greer–Thorbecke index is a measure used to assess poverty levels.

Sen Index correlates the income distribution of individuals at risk of poverty with the occurrence and severity of poverty risk.

Typically, poverty measurement in the field is divided into two main categories: simple headcount ratio measures and more intricate integrated

indicators. Sociologists commonly employ the "headcount ratio" as it enables the identification and computation of impoverished individuals and families within a given culture. Therefore, the essential data required for social-political decision-making and governance processes is acquired (Moisio, 2004, p. 40).

Integrated indices, however, have a broader objective than merely tallying the number of impoverished individuals. They also seek to assess the many aspects and extent of their poverty. Comparing headcount measurements and integrated poverty indices involves an increase in the amount of information needed, as well as an increase in the level of adaptability achieved. The acquisition of this information comes at the expense of clarity (Moisio, 2004, p. 42).

This basic distinction will be used to explain the definition, formulation, place, and importance of each index in practice, as well as its advantages and disadvantages.

5.1. Headcount Ratio

The primary metric utilized to assess overall poverty is known as the "headcount ratio." It is determined by dividing the total population residing below the designated poverty line. This metric denotes the percentage of the population that falls below the poverty line, indicating their low income or consumption level (World Bank, n.d.).

The headcount ratio can be expressed as follows (United Nations, 2017):

$$P_0 = \frac{1}{N} \sum_{i=1}^N I(y_i < z)$$

where P_0 is the proportion of the population that is poor, N is the whole population (or sample), and $I(-)$ is a function that assigns a value of 1 if income/expenditure (y_i) is less than the poverty line (z), and 0 if y_i is greater than z .

Although the headcount ratio is strong and widespread, it has certain limitations. Initially, although it provides information about the quantity of individuals living in poverty, it fails to convey the extent of hardship that individuals endure. The measurement of poverty is binary, without differentiation between individuals slightly below the poverty line and those significantly below it. One result of this is that if those experiencing poverty have a decrease in their poverty level but still remain below the

poverty line, there will be no alteration in the indicator. Likewise, if the severity of individuals' poverty grows, the indicator will not be impacted (United Nations, 2017).

5.2. Poverty Gap Index

The Poverty Gap Ratio is the average gap that separates the population from the poverty line, with a value of "0" for those who are not poor, expressed as a percentage of the poverty line. The index can be formulized as follows (United Nations, 2017):

$$P_0 = \frac{1}{N} \sum_{i=1}^N \frac{G_i}{z}$$

The poverty gap (G_i) is defined as the difference between the poverty line and the actual income or expenditure (adjusted for equivalence) of those living in poverty. For individuals who are not in poverty, the poverty gap is zero. The poverty gap measures the depth of poverty by indicating the distance between a household's income and the poverty line.

This measure quantifies the mean deficit in income or consumption per individual over the entire population in comparison to the poverty line. The measure is derived by aggregating the income gaps of those below the poverty line (assuming zero for those who are not poor) and subsequently dividing this aggregate by the overall population. This measure seeks to calculate the total resources required to elevate all individuals below the poverty line to the poverty threshold, taking into account the population size (Coudouel et al., 2002).

Income gap is generally estimated as the distance between the poverty line and the average income of the poor. The income gap ratio is insensitive to income transfers among the poor and, as a result, does not allow for anyone to rise above the poverty line due to transfers. It does not consider the proportion or number of individuals below the poverty line. It solely focuses on the total gap and does not emphasize how it is distributed among individuals or how many are affected (Sen, 1981).

The poverty gap ratio is subject to its own set of constraints. Essentially, this metric solely offers understanding of the average depth of poverty, rendering it incapable of capturing disparities in inequality among those in poverty. Furthermore, the poverty rate may actually rise instead of decline as individuals escape poverty, especially if the average poverty gap of those who remain worsens. Another factor to take into account is that data

pertaining to the lowest income brackets, particularly those at the extreme bottom, frequently suffer from subpar data quality, which in turn affects the dependability of poverty gap indicators. Another method for assessing the depth of poverty is to analyze headcount ratios using more stringent criteria. In Canada, a small proportion of seniors fall below the 30% line of the low-income measure (LIM), indicating a lower level of poverty for this cohort. This is attributed to the provision of guaranteed income supplements for low-income seniors (United Nations, 2017).

5.3. Square of Poverty Gap Index

The squared poverty gap index calculates the average of the squared values of the poverty gaps in relation to the poverty line. This approach gives greater importance to observations that fall significantly below the poverty threshold, therefore considering the inequality within the impoverished population. Nevertheless, the calculation of the poverty gaps introduces complexity that makes it more challenging to interpret compared to the conventional poverty gap index (United Nations, 2017).

The poverty gap is a measure that quantifies the extent to which the poor are below the poverty line. On the other hand, the square of the poverty gap calculates the squared value of this distance. Additionally, it demonstrates the disparity within the impoverished population. This is because households that are considerably further from the poverty line are assigned a greater weight. When utilizing the poverty gap, it is internally weighted, resulting in a heightened focus on individuals experiencing extreme poverty. Hence, the consideration of disparity within the impoverished population is acknowledged. It is important to acknowledge that this measure has certain limits when it comes to non-monetary factors.

Its primary limitation arises from its complex nature, making it difficult to comprehend and analyze.

5.4. Foster-Greer-Thornbecke Index

This index is expressed as follows (Foster et al., 1984):

$$P(y_i, z) = \frac{1}{nz^2} \sum_{i=1}^q g_i^2$$

Where n denotes the entire number of individuals observed, whereas q, y and z indicate the total count of individuals living in poverty, the income equivalence of poor individuals and poverty line respectively.

By including either the poverty gap or the square of the poverty gap alongside the headcount ratio, this formula allows for a comprehensive representation of several dimensions of income poverty.

5.5. Sen Index

The Sen's poverty index addresses problems of conventional poverty measurements by incorporating two more factors: the extent of income inequality or severity of poverty, and the Gini coefficient within the impoverished population. Poverty indicators, such as poverty rates and headcount ratios, are frequently employed to conveniently assess the percentage of the population that falls below the specified poverty threshold. Nevertheless, there is a contention that poverty rates alone are inadequate in forecasting poverty, as they fail to consider the extent of economic distress experienced by individuals living in poverty (Jesuit & Smeeding, 2002).

Sen (1976) formulizes the index as follows:

$$P = H[I + (1 - I)G]$$

where G is the Gini coefficient of the income distribution of the poor, H is the headcount ratio and T is the income gap ratio.

The Sen Index assigns greater weight to the income of the poorest persons by considering the income of those who are closer to the threshold. Nevertheless, if the reported income is stated as "0" (which is physically implausible) or if the data categorizes low-income households as impoverished, the Sen measure will fail to precisely capture the extent and severity of poverty (Jesuit & Smeeding, 2002).

The Sen Index is an invaluable metric for conducting international poverty comparisons as it consolidates the distribution, intensity, and prevalence of low income into a singular indicator. Conventional metrics, however, frequently fall short in encompassing either of these aspects, resulting in an inadequate representation when comparing poverty rates among nations. Examining the effects of net taxes and transfers on low-income populations is essential for comprehending the disparities in poverty, and it yields distinct alterations for the each poverty components. The Sen Index is contingent upon the earnings of the impoverished and does not take into account fluctuations in the salaries of persons who surpass the poverty level, unless a relative poverty threshold is used (Förster, 1994).

6. Poverty Alleviation Policies

Interventions in the form of poverty alleviation programs demonstrate considerable disparities between developed and developing countries. In industrialized nations, intervention systems are established to distribute social supports and benefits based on a differentiation between individuals who are deemed deserving and those who are deemed undeserving. However, in developing countries, a distribution strategy that prioritizes the internal infrastructure of the community and region, as well as the necessary resources (skills and cash), is put into practice (Morazes & Pintak, 2007, p. 118).

In order to alleviate poverty, developing nations must attain an adequate level of economic growth, nevertheless, the nature of that growth, as opposed to its mere magnitude, is more profoundly significant. The influence of components such as unskilled labor and the type of inputs that the poor can offer to the manufacturing process is particularly essential in this context (Loayza & Raddatz, 2010).

Ensuring inclusive growth, implementing structural changes (economic and institutional), providing tools to help the poor get access to finance (microfinance), assisting the private sector, and putting in place cash³ and income transfer programs as part of social protection systems are just a few of the many strategies used to combat poverty in developing nations (Ayoo, 2022). These methods and policies are remarkable because they aim to tackle poverty by reducing existing levels and lowering the likelihood of poverty through increased inclusion.

For combating poverty both in developed and developing countries, giving access to education (at least secondary level), reducing inequality, decreasing vulnerabilities, addressing issues related to climate change, increasing the performance between policy formation and implementation,

³ The highlighted characteristics of cash transfers are their increased effectiveness, direct benefit to users, resilience creation, ability to operate in conjunction with other forms of humanitarian aid, and compatibility with current social protection programs (European Commission, n.d.). Regular financial payments offered to low-income households under particular conditions are referred to as conditional cash transfers. In contrast to traditional social assistance programs, conditional cash transfer programs directly target low-income households and support the development of human capital by incorporating components like health and education. They also make use of cash more effectively and flexibly, with a high capacity to target poverty (Rawlings & Rubio, 2005; UNICEF, 2014). It is asserted that these policies are successful in transferring income to the impoverished, but it is stressed that this does not mean that they can serve as a comprehensive social safety net. In addition, the long-term welfare impact and effectiveness of these policies, and their performance in terms of the balance between short-term transfer objectives and long-term human development objectives are also the subject of analysis (Fiszbein & Schady, 2009).

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pro-poor growth, enhanced resource management (especially in the agricultural sector), and programs aimed at improving financial access and establishing peace are generally given priority (Filipenco, 2022).

Social protection has become vital for addressing poverty and social exclusion, since it plays a crucial role in fostering inclusive economic growth and facilitating transformative shifts in the labor market. Efforts should be made to ensure the integration of employment and tax policies in order to effectively alleviate poverty. Within this particular framework, the allocation of funds towards social protection serves as a crucial factor in the prevention of poverty, as well as the mitigation of inequality and social exclusion. The current focus among international organizations and governments is on promoting the adoption of universal social protection systems, also known as social protection floors, and improving their inclusiveness. This is considered a preferred policy measure (ILO, 2016).

A dominant viewpoint in the broader framework of poverty reduction initiatives is the belief that poverty is a solitary and universally applicable issue. Nevertheless, adopting a subjective perspective on what is problematic or not in a certain area or region, disregarding locally distinctive processes, and facing difficulties in recognizing the interconnections and compromises among influential factors might undermine the effectiveness of interventions (Carr, 2008)

PART **III**

**ENERGY POVERTY:
A CONSEQUENCE OF INCOME DISPARITIES
AND POVERTY**

III |

ENERGY POVERTY: A CONSEQUENCE OF INCOME DISPARITIES AND POVERTY

The energy sector is anticipated to have major challenges in the present and future, mostly due to climate change, energy poverty, and energy security concerns (González-Eguino, 2015). Energy poverty is becoming increasingly significant in this context, since it refers to the recognition of persons or households who do not have enough energy consumption to fulfill their fundamental requirements (A. K. N. Reddy, 2000). Energy poverty, as defined by the Social Climate Fund regulation and the revised Energy Efficiency Directive, refers to the insufficient access of households to vital energy services, including heating, hot water, cooling, lighting, and electricity for powering appliances (Widuto, 2023).

The widespread use and availability of contemporary energy sources will undeniably yield significant impacts and advantages on vital aspects of society progress, including education, greater salaries, and quality of life. To assess the benefits of electrical access at the household or community level in the energy environment, it is important to analyze the scope and standard of such access (Barnes, 2010). Energy poverty encompasses a range of issues, including the ability to fulfill fundamental energy requirements like heating and lighting, as well as facilitating active involvement in society. The subject holds great significance due to its profound influence on the lowering of productivity, environmental considerations, health, and constraints on developmental potential (González-Eguino, 2015). In addition, one must also take into account its impact on gender roles and educational prospects (Sovacool, 2012).

In this context, the information regarding energy poverty indicators is initially provided in Chapter 3. Subsequently, its association with theories on income distribution and efforts to alleviate poverty are discussed. The chapter concludes with global energy poverty statistics.

1. Energy Poverty Indicators

EU Energy Poverty Observatory (EPOV) identifies two primary indicators for analyzing energy poverty. These indicators are based on consensus and expenditure. The first scenario encompasses the inability to sufficiently heat one's home and the accumulation of unpaid utility bills, while the second scenario involves a low overall energy consumption and the proportion of energy expenses (Thema & Vondung, 2020).

Within the extensive body of the literature on measuring energy poverty, three distinct categories may be discerned: unidimensional indicators, multidimensional indicators, and direct measures (Bardazzi et al., 2021).

Unidimensional metrics provide a description of energy poverty from a singular perspective, focusing on a single dimension. The unidimensional measurements are categorized into two techniques (Pachauri et al., 2004; Sy & Mokaddem, 2022):

- i) The engineering technique calculates the lowest amount of energy needed to provide essential energy services that the household requires.
- ii) The economic approach concentrates on determining the energy poverty threshold by considering the household's income and expenses.

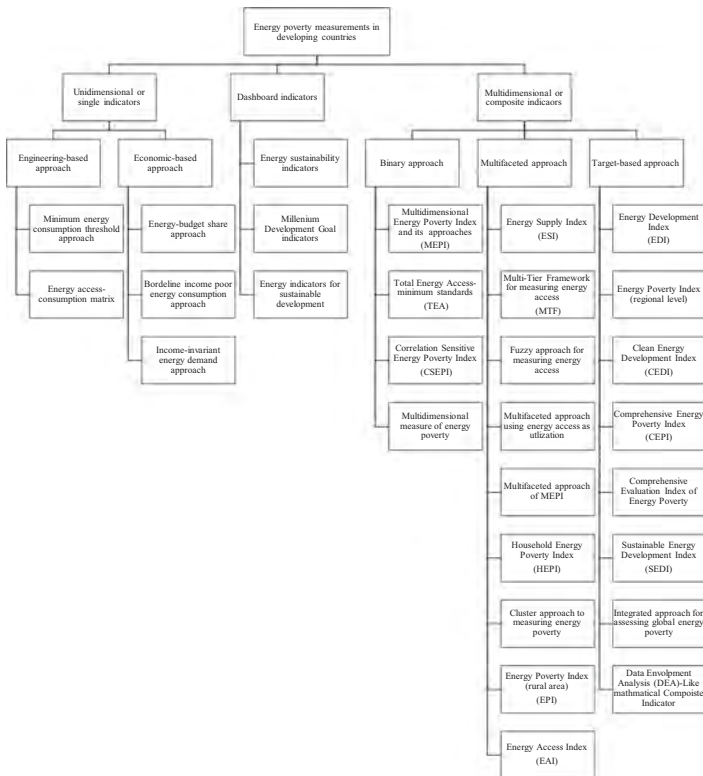
The multidimensional indicators consist of the following two methodologies (Sy & Mokaddem, 2022):

- i) The household-based approach encompasses both the binary and multifaceted dimensions of energy poverty and makes use of national survey data.
- ii) The target-based approach assesses the advancement made in the direction of attaining the sustainable development goal pertaining to the global energy sector by utilizing secondary data collected from multiple countries.

Direct measurements of energy poverty refer to indicators that specifically evaluate the absence of access to contemporary and dependable energy services. These indicators are essential to comprehend the magnitude of energy poverty in a certain region.

Sy & Mokaddem (2022) provide a concise overview of the energy poverty indicators used in developing countries, as presented in Table 6.

Table 6 Energy Poverty Measurements in Developing Countries



Source: Sy & Mokaddem, 2022, p. 7

The dashboard (non-aggregated) indicators consist of individual indicators that are not combined. These indicators involve the acquisition of secondary data and necessitate a comprehensive investigation of the problem of energy poverty across all sectors. According to numerous academics, the dashboard indicators do not effectively enable the comparison of performance between countries or regions (Nussbaumer et al., 2012; Sy & Mokaddem, 2022).

2. Linking Income Distribution Theories with Lack of Energy Access

In the current global setting, politicians, economists, and social scientists are working to tackle the important concerns of reducing socio-economic inequalities and guaranteeing universal access to satisfy the basic needs. An important difficulty arises from the convergence of income distribution and energy access, two interconnected dimensions of society progress. Income distribution theories have been a central focus of economic research for a considerable period of time, examining the complex mechanisms that govern the distribution of wealth within nations. Simultaneously, the absence of energy access, mostly impacting underprivileged people in both developed and developing countries, exacerbates existing inequalities and hinders advancements towards sustainable development objectives. The purpose of this section is to establish a connection between the apparent separation of both domains, by examining the complex relationship between theories of income distribution and the lack of energy accessibility.

The neoclassical economic theory revolves around the concept of profit maximization, implying that decisions are driven by the goal of enhancing utility. Individuals or communities in nations with significant income disparity may have financial limitations, particularly in accessing essential resources such as electricity services. Neoclassical philosophy posits that the distribution of income is determined by market forces and individual choices. This implies that individuals with lower incomes may face greater challenges in affording and accessing modern energy services within the context of energy poverty, hence intensifying disparities in quality of life. The neoclassical theory states that technological advancements, particularly those that reduce the need for labor and capital, significantly influence the distribution of factor shares. Consequently, fluctuations in factor shares can influence the distribution of income within a society. If technical developments favor capital over labor, it might lead to a shift in income distribution. As a result, this may impact the affordability and availability of energy services for different income brackets, exacerbating energy poverty among individuals with low incomes. The impact of capital accumulation on factor shares is determined by technological advancements and substitution elasticity. To comprehend the intricate correlation between economic progress and income distribution, one must possess a great understanding of these matters. Technological advancements and alterations in the degree of substitutability might impact the distribution of resources and income. These adjustments have the potential to impact employment patterns and income distribution, either exacerbating energy poverty or improving it if they prioritize capital-intensive technologies over labor-intensive ones. Neoclassical economists

have examined the enduring stability of factor shares in developed countries, perceiving it as a partially constructed phenomenon. An integral aspect of this inquiry is analyzing the progression patterns and past occurrences of developed nations. The long-term stability or volatility of factor shares has a significant impact on the overall welfare of society, namely in terms of the accessibility of essential services such as energy. Fluctuations in factor shares can serve as indicators of broader economic trends that affect the capacity of various demographic groups to meet their energy needs.

Marx's thesis posits that capitalists amass capital by maintaining wages at a level that just covers basic needs, as their primary motivation is the pursuit of profit. The presence of a labor reserve army hinders the growth of wages. Specific demographic groups may experience limited economic means due to the exploitation of labor and the suppression of wages in the context of energy poverty. Consequently, this could impact their capacity to afford and get sufficient energy services, thereby worsening their energy poverty. Marx argues that capital accumulation is driven by internal competition inside the capitalist system, and this process is a necessity rather than a voluntary decision. This process involves the gradual increase of capital utilized in manufacturing, resulting in advancements in average labor productivity through technological innovations. The energy sector can be influenced by technological breakthroughs that lead to the accumulation of capital. A preference for technology that requires significant capital investment, such as in the energy sector, could exacerbate energy poverty for individuals with low incomes by affecting the availability and affordability of energy services. Marx's thesis highlights the competitive nature of capitalists, which leads to an accelerated accumulation of wealth. Profits have a significant role in determining the distribution of revenue resulting from this competition. The mechanics of capitalist rivalry and economic distribution can have an impact on energy poverty. Disparities in the allocation of resources and profits can worsen the issue of unequal availability of contemporary energy services, as individuals with lower incomes may encounter greater challenges in fulfilling their basic energy requirements. Marx and his adherents argue that the allocation of income is contingent upon production relations and that a different income distribution can only be attained through altering the existing system. It is crucial to tackle the structural challenges related to the generation and distribution of resources in the context of energy poverty. In order to ensure more equal access to energy services, it may be necessary to explore alternative business models or implement legislative initiatives.

Keynesian and Post-Keynesian income distribution theories provide valuable insights into the interrelationships among income, distribution,

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and economic growth, as stated earlier. These ideas can be linked to energy poverty by analyzing their perspectives on the macroeconomic impacts, patterns of saving, and the impact of income distribution on overall demand. By utilizing the Keynesian multiplier concept and analyzing data on output level and employment, it is feasible to comprehend the correlation between salaries and prices, which ultimately impacts employment levels. Changes in income distribution, influenced by the Keynesian multiplier, might affect the ability of various income groups to afford and get energy services within the context of energy poverty. Additionally, these changes can also affect the total demand for energy within an economy.

Post-Keynesian economists like Kalecki, Kaldor and Pasinetti, primarily study the distribution of factor incomes, with a specific focus on wages and profits, which encompass interest and rent. These economists propose innovative models that consider savings, investment, and long-term equilibrium. The allocation of factor incomes, specifically the proportion of profits to salaries, could potentially affect individuals' ability to afford essential utilities such as electricity. For instance, a profit-oriented distribution of income might affect the purchasing power of workers and their ability to acquire energy services. Keynes placed significant emphasis on the impact of income distribution on overall demand. In the 1950s and 60s, researchers explored the interconnections between distribution, trend, and growth, while considering the influence of savings and consumption. Changes in the income distribution can have an impact on both the distribution of wealth and overall economic growth. Comprehending the macroeconomic consequences is crucial in tackling energy poverty as it enables policymakers to devise strategies that ensure equitable access to energy services for all members of society. The current methodologies underscore the importance of fairness in fostering investment, the advancement of human capital, and economic growth. Implementing policies aimed at diminishing economic disparity and promoting all-encompassing economic expansion can exert a favorable impact on energy poverty by enhancing the availability of energy services. According to the idea of capital market imperfections, the presence of equality encourages investments in projects that are distinctive to individuals and in human capital, which then leads to economic growth. Policies aimed at tackling energy poverty should take into account the influence of income distribution on investments in energy infrastructure and technology, as well as the role of inefficiencies in the capital market.

The normative economics perspective on income distribution encompasses several ideas of distributive justice that originate from normative economics. These concepts offer structures for evaluating the equitable

distribution of money. Utilitarians advocate for the equal distribution of money as a means to maximize society utility. An equitable distribution of income can contribute to ensure that all individuals have fair and equal access to essential energy services, hence addressing disparities in energy access and alleviating energy poverty. Strict egalitarianism promotes the advocacy of fair and equal standards of products and services for all individuals. This theory promotes fairness and inclusivity in energy access by addressing energy poverty. It advocates for equal distribution of resources to meet the energy demands of each individual. Rawls prioritizes the safeguarding of human freedom and rights by emphasizing the importance of equal economic rights and the establishment of a welfare state. Applying Rawls's concepts to the problem of energy poverty would involve creating conditions in which every individual has equitable access to opportunities and resources, including affordable and reliable energy services. Nozick's focus on non-patterned justice principles and historical rights suggests that the fairness of a distribution is influenced by its historical context. To address energy poverty effectively, it is crucial to consider the historical factors that have led to disparities in energy availability and implement suitable measures to ensure a fairer distribution. Applying desert-based theories, which consider factors like productivity and effort, to address energy poverty could consider individuals' endeavors to enhance their energy availability. For instance, the distribution of energy resources could incentivize individuals who actively adopt sustainable energy practices. Resource-based theories, which prioritize resource equality and individual freedom in determining outputs, may have relevance to addressing the problem of energy poverty by promoting equitable access to energy resources. Ensuring individuals have the necessary resources to fulfill their energy requirements and tackling the root causes of energy disparity may be included in this approach.

Econophysics is a discipline that aims to utilize ideas derived from natural laws, particularly employing physics-based methodologies to comprehend the economic phenomena. There are two income classes: one that represents the majority and has a distribution similar to Boltzmann-Gibbs, and another that represents the minority (upper-income group) and has a distribution matching Pareto distribution. In the context of energy poverty, this might be likened to the uneven distribution of energy access, with a majority of the population having limited access to energy while a minority has more access.

In summary, the neoclassical economic theory offers a structured approach to comprehend and analyze the intricacies of income distribution. It places a significant importance on individual choices, market dynamics, and the influence of technological advancements on the distribution of resources.

By adopting this approach, one can gain a deeper understanding of the intricacies of energy poverty within a culture. Marx's income theory offers a conceptual framework for understanding the dynamics of exploitation, capital accumulation, and rivalry in a capitalist society. An analysis of these components facilitates the exploration of connections to the issues related to energy poverty, particularly in relation to the impact of economic systems and the distribution of money on individuals' and communities' ability to access fundamental energy services. The Keynesian and Post-Keynesian theories on income distribution offer frameworks for examining the connections between income, distribution, and economic processes. Comprehending these theories well is essential for formulating comprehensive policies to tackle energy poverty and promote sustainable and inclusive economic growth. Normative economic theories provide many perspectives for assessing and tackling income distribution, taking into account its impact on energy poverty. Each theory offers distinct viewpoints on justice and fairness, and their relevance to energy poverty necessitates a careful examination of how resources, opportunities, and benefits are allocated in relation to energy accessibility and affordability. Applying econophysics principles to income distribution provides a valuable framework for understanding economic structures and the dynamics of energy poverty. It offers insights into the complex interplay of societal interactions and distribution models, allowing a holistic perspective to address challenges related to access and distribution of energy resources.

3. Poverty Alleviation in Terms of Energy

The battle against energy poverty is inherently connected to endeavors focused on environmental preservation and the alleviation of climate change impacts. Enhancing global availability of contemporary energy sources would result in a rise in the demand for energy and the subsequent release of CO₂ emissions. As a result, there may be a conflict or trade-off between achieving pro-poor growth policies and reducing energy poverty, which could accelerate middle class growth and raise consumption and CO₂ emissions (Chakravarty & Tavoni, 2013).

According to the findings of Rodriguez-Alvarez et al. (2021), an examination of 30 European countries from 2005 to 2018 revealed that energy poverty was less prevalent in nations with a relatively equitable income distribution and a higher per capita income. Enhancing energy efficiency helps to decrease energy poverty, while the existence and organization of social protection programs also have a substantial impact on mitigating energy poverty. In summary, the findings suggest that implementing policies and strategies that improve the financial

circumstances of disadvantaged populations, lower energy costs, and boost energy efficiency are effective in addressing energy poverty.

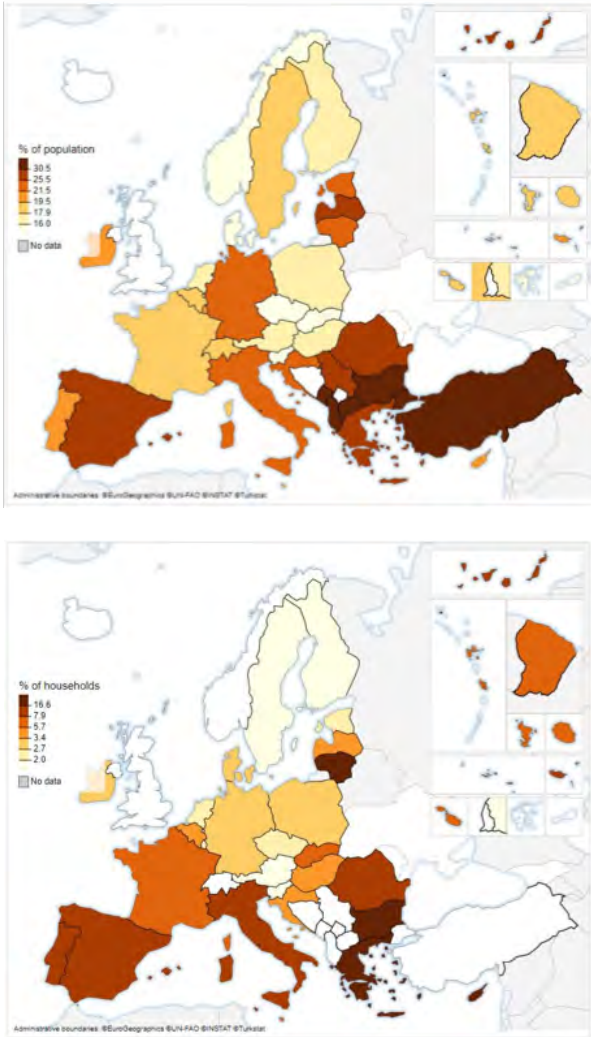
In the battle against energy poverty, renewable energy sources and technologies both have a role to play. Lu et al. (2023) examined the association between several renewable energy technologies and energy poverty and found that hydroelectricity is one of the most effective ways to reduce the latter. The study by Zhao et al. (2022) also demonstrates how effectively the growth of the clean and renewable energy industry can address energy poverty globally. In their empirical study, Halkos & Gkampoura (2023) examine the effects of per household use of fossil fuels, renewable resources, and biofuels on energy poverty for EU-28 nations over the years 2004–2019. The difficulty to keep dwellings adequately warm as well as the existence of leaks, wetness, or decay in the housing are inversely correlated with the per capita consumption of renewable energy sources and biofuels in families. To sum up, in the effort to fight against energy poverty, the proportion and degree of clean and renewable energy used in all energy resources are becoming more and more important. Not to be overlooked, though, is the fact that nations implementing renewable energy sources must be able to recognize the threats associated with this shift and implement risk-reduction strategies (Adom et al., 2021).

The idea of energy poverty, which is more comprehensive than fuel poverty⁴, is analyzed based on income, pricing, and energy efficiency. Within this framework, the significance of everyday life activities, physical and institutional rules pertaining to the constructed surroundings, family necessities, and notions of social resilience becomes prominent. Evaluations are conducted that extend beyond the realm of energy shortage exclusively. Given that energy poverty is an intrinsic consequence of local social, political, and environmental factors, it would be most advantageous to address energy poverty through regional policies within the European Union. In order to address this issue, it is possible to apply demand-side energy efficiency strategies, such as market changes and building enhancements (Bouzarovski, 2014).

⁴ Fuel poverty refers to the condition where households spend a significant amount of their incomes on maintaining a suitable indoor temperature in their houses. The primary factors that have the greatest impact on it are the income of households, the pricing of fuel, and the levels of energy use (Hinson & Bolton, 2023). Fuel poverty indicates the situation where a household is unable to afford the necessary energy services for their home due to their present income (Boardman, 2012).

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*Figure 6: First: Poverty Risk or Social Exclusion
Second: Inability to keep home adequately warm*



Source: Gouveia et al. (2022)

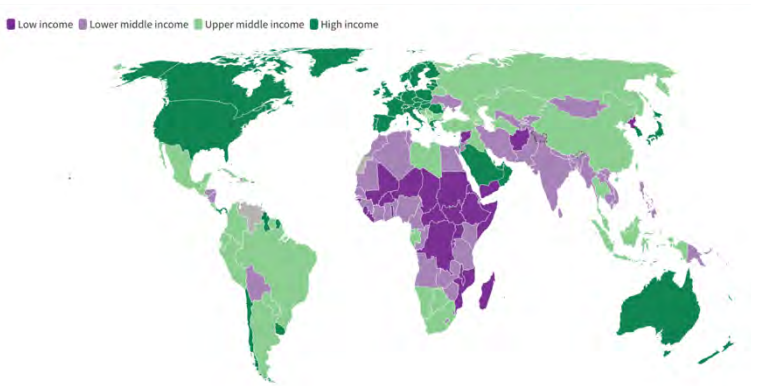
The EPAH reports that the problem of energy poverty in Europe has been growing. The first panel of Figure 6 illustrates the risk of poverty, whereas the second panel depicts the challenge of maintaining an adequately warm residence. Evidently, countries such as Greece, Bulgaria, and Portugal have a significant poverty risk and a considerable proportion of households that lack adequate heating systems. The reports reveal that approximately 32%

of the population in Turkey is at risk of poverty, and 33.6% of the non-institutional population faces heating issues due to inadequate insulation and difficulties in their homes, such as leaking roofs, moist walls/floors/foundation, and rot in window frames/floors in 2022 (Turkish Statistical Institute, 2022b).

4. Regional Disparities: Developing vs. Developed Nations

The disparities between developing and developed countries highlight a distinct aspect of energy poverty. This section reviews the intricate factors contributing to regional disparities in energy distribution. Energy poverty, defined as a lack of reliable and affordable energy supply, highlights the socioeconomic disparity between nations with strong energy infrastructures and those with inadequate resources.

Figure 7 Income Group Classification defined by the World Bank



Source: World Bank

Energy poverty is prevalent worldwide, however in certain regions, the percentage is escalating. This book utilizes the income group classifications defined by the World Bank for assessment purposes (Figure 7⁵). Upon assessing electricity accessibility, it is evident that wealthy nations like the United Kingdom, United States, and European Union have achieved comprehensive energy coverage for their whole populations. Moreover, in nations classified as upper-middle-income, middle-income, and lower-middle-income, the prevalence rate exceeds 90%. It is apparent that in low-income nations like Sub-Saharan Africa, half of the population does not have access to power. In the early years of the twenty-first century, the

⁵ Comprehensive list of countries can be found in the Appendix.

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worldwide availability of electricity stood at 78%. However, by 2021, this figure has risen to 91%. The accessibility of energy has been enhanced through government programs, technological advancements, and multinational alliances. The gap in power access has been narrowed and power access has been widened due to enhancements in electrical infrastructure and distribution networks. Notwithstanding these advancements, unwavering dedication and assistance are required to reach the inaccessible, particularly in economically impoverished nations such as Sub-Saharan Africa.

Table 7 Access to electricity (% of population)

Year	1990	2000	2008	2018	2019	2020	2021
United Kingdom	100	100	100	100	100	100	100
Türkiye		100	100	100	100	100	100
United States	100	100	100	100	100	100	100
European Union	100	99	100	100	100	100	100
High income	100	100	100	100	100	100	100
Upper middle income		94	97	99	99	99	99
Latin America & Caribbean		92	95	98	98	98	98
East Asia & Pacific (excluding high income)		91	95	97	98	98	98
Middle East & North Africa		92	95	96	97	97	97
Middle income		78	84	93	93	94	95
World		78	83	90	90	90	91
Lower middle income		61	72	88	88	89	91
Low & middle income		74	79	88	88	89	90
Sub-Saharan Africa (excluding high income)		26	32	46	47	48	51
Low income		16	23	40	42	43	45

Source: World Bank

As previously stated, energy poverty pertains to the inadequate means by which households obtain critical energy services such as lighting, heating, hot water, ventilation, and electricity to operate appliances. In this regard, it is clear that every person in high-income countries has access to clean energy when evaluating the population's availability of clean fuels and cooking technology from the early 2000s to the present. However, as of 2021, this percentage in the low-income countries group is still remarkably low at 16.2% (Table 8).

Table 8 Access to clean fuels and technologies for cooking (% of population)

Year	2000	2008	2019	2020	2021
European Union	100.0	100.0	100.0	100.0	100.0
United Kingdom	100.0	100.0	100.0	100.0	100.0
United States	100.0	100.0	100.0	100.0	100.0
High income	100.0	100.0	100.0	100.0	100.0
Turkiye	90.2	93.7	95.4	95.4	95.4
Middle East & North Africa (excluding high income)	86.1	94.1	95.4	95.3	95.3
Latin America & Caribbean (excluding high income)	78.4	83.6	87.6	87.8	88.1
Upper middle income	52.7	63.7	83.2	84.5	85.6
Europe & Central Asia (excluding high income)	89.4	91.8	86.6	85.8	84.7
East Asia & Pacific (excluding high income)	34.5	48.0	75.9	77.9	79.7
Middle income	40.4	49.3	68.4	70.1	71.8
World	49.1	55.3	68.9	70.2	71.3
Low & middle income	38.0	46.1	63.0	64.6	66.0
Lower middle income	27.6	35.4	55.2	57.5	59.7
Sub-Saharan Africa (excluding high income)	8.8	11.4	17.6	18.4	19.1
Low income	8.7	11.5	15.2	15.7	16.2

Notably, in 2018, the proportion of people living on less than \$2.15 in low-income nations was 45.3%, whereas in high-income countries, this figure was nearly negligible (Table 9).

Table 9 Poverty headcount ratio at \$2.15 a day (2017 PPP) (% of population)

Year	1981	1990	2000	2008	2018	2019	2020	2021
Low income			60.3	48.3	45.3			
Lower middle income	49.0	43.7		27.3	12.4	12.4	11.9	10.9
Low & middle income	55.5	47.1	35.6	22.7	10.8	10.7	6.1	
World	43.6	37.9	29.3	18.8	9.1	9.0		
Upper middle income	60.8	48.4	30.2	13.6	2.0	1.8	1.2	
United States	0.5	0.5	0.7	1.0	1.0	1.0	0.2	0.2
Turkiye				0.6	0.0	0.4		
High income		0.6	0.7	0.5	0.6	0.6	0.4	
United Kingdom	0.0	0.0	0.2	0.2	0.5	0.5	0.5	

Nussbaumer et al. (2013) conducted a calculation of Multidimensional Energy Poverty Indices and determined that countries experiencing more pronounced energy poverty are situated in sub-Saharan Africa (specifically, in chronological order): Kenya, Sierra Leone, Timor-Leste, Uganda, Guinea, Malawi, Rwanda, Madagascar, Tanzania, Mozambique, Benin, Mali, Liberia, Democratic Republic of Congo, Ethiopia, Burundi, and Niger), as well as in South-East Asia: Bangladesh and Timor-Leste. The findings also indicate that Latin America and the Caribbean have relatively low to moderate levels of energy poverty, while Northern Africa has low levels. In these nations, it is evident that there is a significant level of income inequality. Despite being based on data from nearly a decade ago, the calculations yield similar outcomes when considering the availability of clean fuels and cooking technologies.

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Table 10 Gini Index

Country Name	1981	1991	1999	2000	2002	2004	2008	2015	2018	2019	2020	2021
Bolivia			58.1	61.6	59.3	55	50.8	46.7	42.6	41.6	43.6	40.9
Brazil	57.9		59		58.1	56.5	54	51.9	53.9	53.5	48.9	52.9
Germany		29.5	29	28.8	29.9	30.2	30.9	31.4	31.8	31.7		
Ethiopia			30			29.8		35				
United Kingdom	29.7	35	36.8	38.8	35.1	34.8	35.4	33.3	33.7	32.8	32.6	
India						34.4		34.7	34.6	35	34.8	34.2
Mali									36			
Mozambique					47		45.6			50.5		
Niger									37.3			
Türkiye					41.4	41.3	39	42.9	41.9	41.9		
United States	35.5	38	40	40.1	40.4	40.3	40.8	41.2	41.4	41.5	39.7	39.8
South Africa				57.8			63					
Zambia		60.5			42.1	54.3		55.9				

Source: World Bank

Energy poverty might worsen current levels of income inequality. On the other hand, a rise in income disparity worsens the problem of energy poverty. Given the bilateral connection between energy poverty and income inequality, it is imperative for policymakers to develop policies that address both elements (Nguyen & Nasir, 2021).

Examining researches indicating the connection between income inequality and energy poverty will be important for determining the kinds of policies that may be put in place to address energy poverty.

Opoku et al. (2024) used the Granger causality test and the case of Ghana to examine how income inequality affected energy poverty over the 1990–2021 period. The before-tax and before-transfer Gini value and the after-tax and after-transfer Gini value were selected as the two indicators for income inequality. Energy poverty was measured using five different indicators. It is advised to liberalize trade and focus on foreign direct investments to tackle energy poverty and reduce income disparity when the variables influencing both indicators were assessed. Incorporating energy poverty reduction techniques into income poverty reduction policies will not only increase low-income earners' access to current energy but also improve their affordability in this manner.

Igawa & Managi (2022) used data from 37 nations that represented a range of income levels to investigate the relationship between energy poverty and income inequality through the characteristics of accessibility, reliability, and affordability. They discovered that the characteristics of accessibility and reliability for average households show a rising tendency with economic development. Based on these findings, they came to the

conclusion that nations with high income inequalities and medium levels of economic development have the lowest affordability. Apart from variables at the national level, diverse socioeconomic factors at the household level are also connected to energy poverty in different ways. In conclusion, the research's primary finding is that energy poverty is exacerbated by inequality in income.

Barış & Demir (2023) used data from 14 developing nations for the years 2000-2019 to conduct an empirical analysis of the relationship between energy poverty and income inequality. Energy poverty is the dependent variable and is measured by the percentage of the population that has access to electricity and the percentage of the population that has access to clean fuels and technologies for cooking. In addition, income inequality is measured by the Gini coefficient. The results prove that income inequality negatively affects energy poverty. In view of these findings, policies aimed at reducing energy poverty should also focus on combating income inequality. Policy interventions should go beyond policies focused solely on access to electricity, with incentives and supports provided to prioritize the use of clean fuel and technology for cooking.

For Pakistan between 1973 and 2012, Murtaza & Faridi (2015) examine the dynamic causality relationship between energy poverty, growth, income poverty, and income inequality. There is a bidirectional causal relationship between income poverty and energy poverty in addition to a significant unidirectional relationship between growth and energy poverty. These findings demonstrate the necessity of adopting growth policies that support the poor (pro-poor growth) to mitigate the inequality in income distribution.

Four key strategies are discussed by Team & Baffert (2015) in order to tackle energy poverty for the members of the European Union such as financial intervention with the existence of social welfare programs, consumer protection, energy-saving techniques and information provision that raises awareness of the consumers. According to the research of Kyprianou et al., (2019), a decentralized strategy could be more advantageous in mitigating energy poverty. To deal with energy poverty and support low-income households, there should be a greater emphasis on local initiatives as well as national and EU levels. One notable weakness in the European Union policy framework is that directives are often applicable to all consumers at risk of poverty, rather than just those who are energy-vulnerable.

Poverty cannot be eradicated by having access to electricity unless it is affordable for the lowest-income households. While strategies that support

**PART III: ENERGY POVERTY:
A CONSEQUENCE OF INCOME DISPARITIES AND POVERTY**

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vulnerable households with social security networks are implemented, attention should also be paid to energy price policies. In this situation, reducing poverty will require more than just having access to clean cooking and energy. Energy-efficient and low-cost vehicles and techniques also need to be provided in areas used by the poor, such as agricultural processing, housing and transportation. This viewpoint also highlights how the battle against energy poverty is all-encompassing and how it interacts with the objectives of sustainable development (United Nations, 2018).

To summarize, the investigation of energy poverty worldwide has revealed an unpleasant reality - a clear distinction between developed and developing countries, highlighting the many reasons that contribute to regional inequalities in energy allocation. Through the analysis across different continents and income groups, it became clear that although there has been progress in improving global energy availability, there are still considerable obstacles, especially in economically disadvantaged areas such as Sub-Saharan Africa. The indisputable correlation between energy poverty and income disparity, as evidenced by thorough research, necessitates immediate action from politicians. Studies conducted by Opoku et al. (2024), Igawa & Managi (2022), Barış & Demir (2023), and Murtaza & Faridi (2015) emphasize the necessity of comprehensive policies that reduce both energy poverty and income inequality, acknowledging their bidirectional influence. The significance of local initiatives and decentralized approaches is emphasized in the strategies proposed for the European Union by Team & Baffert (2015) and Kyprianou et al. (2019). In essence, addressing energy poverty goes beyond simply providing access and includes the need for cost-effectiveness, requiring holistic approaches that incorporate social well-being, safeguarding consumer rights, and implementing specific initiatives. The incorporation of clean and cost-effective energy into several aspects of living, ranging from housing to transportation, arises as a crucial element of sustainable development. The collaboration of countries, driven by the discoveries of this study, is crucial in guaranteeing that the fight against energy poverty and income inequality is not only comprehensive but also in harmony with the wider goals of a sustainable and fair future.

CONCLUSION

Energy poverty is an essential issue, whether considered from a sociological or economic perspective. An accurate analysis of worldwide changes in energy supply and demand is crucial for maintaining a robust economic framework. The choices and inclinations of a nation in relation to energy have a significant impact not only on that nation itself, but also on the entire global system. In the present period, where climate change is a prominent topic of discussion, the extensive utilization of energy resources, particularly fossil fuels, has a negative influence on environmental preservation and efforts to address and reduce the effects of climate change. The interaction between these factors also impacts the development of methods and policies aimed at addressing energy poverty.

Undesirable consequences in a prosperous economic framework include inflation, unemployment, income disparity, and poverty. When confronted with these issues, policies are put into action to interfere. Income inequality and poverty have a detrimental effect on persons' well-being, leading to social exclusion, vulnerability, and unfavorable living situations, thereby impacting their dignified life and fundamental human rights.

Poverty refers to the state of being unable to fulfill basic necessities, while energy poverty specifically refers to the lack of sufficient access to vital energy services inside families. Energy poverty can be assessed by examining expenditure and consensus variables, employing distinct assessment methods for rich and developing nations. The distribution of income within a country is intricately linked to poverty and is impacted by factors such as globalization, economic progress, and technical advancements, resulting in a reciprocal relationship between these indicators. Energy poverty is a global reality, although its severity differs across geographies, with certain areas experiencing it more intensively.

CONCLUSION

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When analyzing energy poverty, it is essential to consider factors such as income levels, energy prices, and the existence of subsidies.

Finally, the complex relationship between the distribution of income and the issue of energy poverty highlights the urgent requirement for comprehensive measures that tackle both the economic and sociocultural aspects. As we confront the difficulties caused by climate change and the wasteful utilization of energy resources, it becomes clear that the consequences go well beyond environmental issues, affecting the fundamental aspects of social welfare. The deleterious consequences of income disparity and poverty extend far from the individual level and have profound impacts on communities and nations, ultimately influencing the global panorama. Policies targeting the reduction of energy poverty in this situation should be integrated into comprehensive frameworks that address the underlying factors contributing to economic inequality. Achieving more equitable and sustainable future is possible for society as a whole by recognizing the intricate interrelationship between energy poverty, income inequality, and broader socioeconomic challenges.

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APPENDICES

Appendix 1. List of Low-Income Economies

Country	Region
Afghanistan	South Asia
Burundi	Sub-Saharan Africa
Burkina Faso	Sub-Saharan Africa
Central African Republic	Sub-Saharan Africa
Congo, Dem. Rep.	Sub-Saharan Africa
Eritrea	Sub-Saharan Africa
Ethiopia	Sub-Saharan Africa
Gambia, The	Sub-Saharan Africa
Guinea-Bissau	Sub-Saharan Africa
Liberia	Sub-Saharan Africa
Madagascar	Sub-Saharan Africa
Mali	Sub-Saharan Africa
Mozambique	Sub-Saharan Africa
Malawi	Sub-Saharan Africa
Niger	Sub-Saharan Africa
Korea, Dem. People's Rep.	East Asia & Pacific
Rwanda	Sub-Saharan Africa
Sudan	Sub-Saharan Africa
Sierra Leone	Sub-Saharan Africa
Somalia	Sub-Saharan Africa
South Sudan	Sub-Saharan Africa
Syrian Arab Republic	Middle East & North Africa
Chad	Sub-Saharan Africa
Togo	Sub-Saharan Africa
Uganda	Sub-Saharan Africa
Yemen, Rep.	Middle East & North Africa

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Appendix 2. List of Lower Middle-Income Economies

Country	Region	Country	Region
Angola	Sub-Saharan Africa	Sri Lanka	South Asia
Benin	Sub-Saharan Africa	Lesotho	Sub-Saharan Africa
Bangladesh	South Asia	Morocco	Middle East & North Africa
Bolivia	Latin America & Caribbean	Myanmar	East Asia & Pacific
Bhutan	South Asia	Mongolia	East Asia & Pacific
Côte d'Ivoire	Sub-Saharan Africa	Mauritania	Sub-Saharan Africa
Cameroon	Sub-Saharan Africa	Nigeria	Sub-Saharan Africa
Congo, Rep.	Sub-Saharan Africa	Nicaragua	Latin America & Caribbean
Comoros	Sub-Saharan Africa	Nepal	South Asia
Cabo Verde	Sub-Saharan Africa	Pakistan	South Asia
Djibouti	Middle East & North Africa	Philippines	East Asia & Pacific
Algeria	Middle East & North Africa	Papua New Guinea	East Asia & Pacific
Egypt, Arab Rep.	Middle East & North Africa	Senegal	Sub-Saharan Africa
Micronesia, Fed. Sts.	East Asia & Pacific	Solomon Islands	East Asia & Pacific
Ghana	Sub-Saharan Africa	São Tomé and Príncipe	Sub-Saharan Africa
Guinea	Sub-Saharan Africa	Eswatini	Sub-Saharan Africa
Honduras	Latin America & Caribbean	Tajikistan	Europe & Central Asia
Haiti	Latin America & Caribbean	Timor-Leste	East Asia & Pacific
India	South Asia	Tunisia	Middle East & North Africa
Iran, Islamic Rep.	Middle East & North Africa	Tanzania	Sub-Saharan Africa
Jordan	Middle East & North Africa	Ukraine	Europe & Central Asia
Kenya	Sub-Saharan Africa	Uzbekistan	Europe & Central Asia
Kyrgyz Republic	Europe & Central Asia	Vietnam	East Asia & Pacific
Cambodia	East Asia & Pacific	Vanuatu	East Asia & Pacific
Kiribati	East Asia & Pacific	Samoa	East Asia & Pacific
Lao PDR	East Asia & Pacific	Zambia	Sub-Saharan Africa
Lebanon	Middle East & North Africa	Zimbabwe	Sub-Saharan Africa

Appendix 3. List of Upper-Middle Income Economies

Country	Region	Country	Region
Albania	Europe & Central Asia	Libya	Middle East & North Africa
Argentina	Latin America & Caribbean	St. Lucia	Latin America & Caribbean
Armenia	Europe & Central Asia	Moldova	Europe & Central Asia
Azerbaijan	Europe & Central Asia	Maldives	South Asia
Bulgaria	Europe & Central Asia	Mexico	Latin America & Caribbean
Bosnia and Herzegovina	Europe & Central Asia	Marshall Islands	East Asia & Pacific
Belarus	Europe & Central Asia	North Macedonia	Europe & Central Asia
Belize	Latin America & Caribbean	Montenegro	Europe & Central Asia
Brazil	Latin America & Caribbean	Mauritius	Sub-Saharan Africa
Botswana	Sub-Saharan Africa	Malaysia	East Asia & Pacific
China	East Asia & Pacific	Namibia	Sub-Saharan Africa
Colombia	Latin America & Caribbean	Peru	Latin America & Caribbean
Costa Rica	Latin America & Caribbean	Palau	East Asia & Pacific
Cuba	Latin America & Caribbean	Paraguay	Latin America & Caribbean
Dominica	Latin America & Caribbean	West Bank and Gaza	Middle East & North Africa
Dominican Republic	Latin America & Caribbean	Russian Federation	Europe & Central Asia
Ecuador	Latin America & Caribbean	El Salvador	Latin America & Caribbean
Fiji	East Asia & Pacific	Serbia	Europe & Central Asia
Gabon	Sub-Saharan Africa	Suriname	Latin America & Caribbean
Georgia	Europe & Central Asia	Thailand	East Asia & Pacific
Equatorial Guinea	Sub-Saharan Africa	Turkmenistan	Europe & Central Asia
Grenada	Latin America & Caribbean	Tonga	East Asia & Pacific
Guatemala	Latin America & Caribbean	Turkiye	Europe & Central Asia
Indonesia	East Asia & Pacific	Tuvalu	East Asia & Pacific
Iraq	Middle East & North Africa	St. Vincent and the Grenadines	Latin America & Caribbean
Jamaica	Latin America & Caribbean	Kosovo	Europe & Central Asia
Kazakhstan	Europe & Central Asia	South Africa	Sub-Saharan Africa

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Appendix 4. List of High-Income Economies

Country	Region	Country	Region
Aruba	Latin America & Caribbean	Germany	Europe & Central Asia
Andorra	Europe & Central Asia	Denmark	Europe & Central Asia
United Arab Emirates	Middle East & North Africa	Spain	Europe & Central Asia
American Samoa	East Asia & Pacific	Estonia	Europe & Central Asia
Antigua and Barbuda	Latin America & Caribbean	Finland	Europe & Central Asia
Australia	East Asia & Pacific	France	Europe & Central Asia
Austria	Europe & Central Asia	Faroe Islands	Europe & Central Asia
Belgium	Europe & Central Asia	United Kingdom	Europe & Central Asia
Bahrain	Middle East & North Africa	Gibraltar	Europe & Central Asia
Bahamas	Latin America & Caribbean	Greece	Europe & Central Asia
Bermuda	North America	Greenland	Europe & Central Asia
Barbados	Latin America & Caribbean	Guam	East Asia & Pacific
Brunei Darussalam	East Asia & Pacific	Guyana	Latin America & Caribbean
Canada	North America	Hong Kong SAR, China	East Asia & Pacific
Switzerland	Europe & Central Asia	Croatia	Europe & Central Asia
Channel Islands	Europe & Central Asia	Hungary	Europe & Central Asia
Chile	Latin America & Caribbean	Isle of Man	Europe & Central Asia
Curaçao	Latin America & Caribbean	Ireland	Europe & Central Asia
Cayman Islands	Latin America & Caribbean	Iceland	Europe & Central Asia
Cyprus	Europe & Central Asia	Israel	Middle East & North Africa
Czechia	Europe & Central Asia	Italy	Europe & Central Asia
Japan	East Asia & Pacific	Puerto Rico	Latin America & Caribbean
St. Kitts and Nevis	Latin America & Caribbean	Portugal	Europe & Central Asia
Korea, Rep.	East Asia & Pacific	French Polynesia	East Asia & Pacific
Kuwait	Middle East & North Africa	Qatar	Middle East & North Africa
Liechtenstein	Europe & Central Asia	Romania	Europe & Central Asia
Lithuania	Europe & Central Asia	Saudi Arabia	Middle East & North Africa
Luxembourg	Europe & Central Asia	Singapore	East Asia & Pacific
Latvia	Europe & Central Asia	San Marino	Europe & Central Asia
Macao SAR, China	East Asia & Pacific	Slovak Republic	Europe & Central Asia
St. Martin (French part)	Latin America & Caribbean	Slovenia	Europe & Central Asia
Monaco	Europe & Central Asia	Sweden	Europe & Central Asia
Malta	Middle East & North Africa	Sint Maarten (Dutch part)	Latin America & Caribbean
Northern Mariana Islands	East Asia & Pacific	Seychelles	Sub-Saharan Africa
New Caledonia	East Asia & Pacific	Turks and Caicos Islands	Latin America & Caribbean
Netherlands	Europe & Central Asia	Trinidad and Tobago	Latin America & Caribbean
Norway	Europe & Central Asia	Taiwan, China	East Asia & Pacific
Nauru	East Asia & Pacific	Uruguay	Latin America & Caribbean
New Zealand	East Asia & Pacific	United States	North America
Oman	Middle East & North Africa	British Virgin Islands	Latin America & Caribbean
Panama	Latin America & Caribbean	Virgin Islands (U.S.)	Latin America & Caribbean
Poland	Europe & Central Asia		

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INCOME DISTRIBUTION & ENERGY POVERTY
A GENERAL OVERVIEW

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Energy has become a vital and driving factor in the modern global environment, impacting every aspect of human existence. The significance of this reaches across all facets of civilization, encompassing electricity generation, heating, transportation, and industrial activities. However, substantial differences in the availability and utilization of energy contribute to the basis of internal disparities, which have an impact on the welfare of communities globally. This pioneering research reveals the fundamental factors behind these disparities, providing valuable perspectives on the significant influence of income distribution and economic inequities. The book examines the relationship between income distribution and access to energy, revealing how economic discrepancies impact the availability of energy supplies. Moreover, it highlights the urgent need for laws and efforts that specifically target these unfair practices, with the goal of achieving a fairer allocation of energy resources and improving the general well-being of communities worldwide.

***Hale Kırer Silva Lecuna** is an economist and mathematician focused on income distribution, energy, economic complexity, and econophysics. Currently, she teaches and researches at Bandırma Onyedi Eylül University, Turkey, as an Associate Professor. She carried out research at The New School for Social Research (NSSR, New York) and Kiel University (CAU, Germany), and also gave lectures at St. John's University and the Henry George School of Social Science in New York.*

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