

Understanding the Link Between Energy Poverty and Children's Well-being in Developing Contexts

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発展途上国におけるエネルギー貧困と子どもの幸福度との関連性の解明

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要旨：本研究は、エチオピア、インド、ペルー、ベトナムの4か国における子どもの主観的幸福度に対するエネルギー貧困の因果的影響を分析するものである。エネルギー貧困は、Young Lives プロジェクトの縦断データを用い、多次元的枠組みに基づいて測定した。潜在的な内生性の問題に対処するため、各国の住宅用電力価格を操作変数とし、二段階最小二乗法（2SLS）を適用した。分析結果は、異なる測定閾値の下においても、エネルギー貧困が子どもの主観的幸福度を有意に低下させることを示している。この負の影響は推定仕様を変更しても頑健であり、男子および高年齢層の子どもにおいてより顕著であることが確認された。さらに、健康状態がエネルギー貧困と主観的幸福度の低下を結びつける主要な媒介経路であることが明らかとなった。

キーワード：エネルギー貧困；多次元エネルギー貧困指数；操作変数；Young Lives

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Abstract: This study investigates the causal impact of energy poverty on children's subjective well-being in four developing countries: Ethiopia, India, Peru, and Vietnam. Energy poverty is measured using a multidimensional framework applied to longitudinal data from the Young Lives project. To address potential endogeneity concerns, we employ a two-stage least squares (2SLS) approach, instrumenting household energy poverty with residential electricity prices at the country level. The results indicate that energy poverty significantly reduces children's subjective well-being across alternative measurement thresholds. The negative effects are robust across specifications and are more pronounced among boys and older children. Additional analysis shows that health status serves as a key transmission channel linking energy deprivation to lower subjective well-being.

Keywords: energy poverty; multidimensional energy poverty index; instrumental variable; Young Lives.

1. Introduction

Energy plays a fundamental role in economic and social development, affecting key sectors such as education, healthcare, and agriculture (Chen et al., 2023). However, the global energy sector faces major challenges related to supply security, climate change, and energy poverty (González-Eguino, 2015; Li et al., 2022a). Recognizing its importance, the United Nations includes universal energy access in Sustainable Development Goal 7 (SDG7). Despite progress, energy poverty remains widespread. In 2023, nearly 9% of individuals in 17 European OECD countries were unable to keep their homes adequately warm (OECD, 2024). Globally, around 2.4 billion people still lack access to clean cooking facilities, and 660 million are projected to remain without electricity by 2030 if current trends persist (IEA, 2022; IEA et al., 2023).

Energy poverty refers to inadequate access to affordable, reliable, and clean energy needed to meet basic household needs (Reddy et al., 2000). It is driven by limited energy access, poor energy quality, and high energy costs (González-Eguino, 2015; Li et al., 2022a). In developing countries, energy poverty often manifests as reliance on traditional biomass fuels, while in developed countries it is linked to affordability constraints (Welsch & Biermann, 2017).

The consequences of energy poverty are severe, particularly for public health. The use of biomass and solid fuels exposes households to indoor air pollution, contributing to over 3.2 million deaths annually, with children disproportionately affected (WHO, 2024). Prolonged exposure to indoor pollutants increases the risk of respiratory and cardiovascular diseases, especially among women and young children. Cold and poorly heated homes further exacerbate respiratory illnesses, with long-term health consequences accumulating throughout childhood.

While these health impacts are well documented, the broader implications for children’s psychological well-being remain less explored. Beyond objective outcomes such as income and health, emerging research highlights the negative impact of energy poverty on subjective well-being (Li et al., 2022b; Nie et al., 2021). Subjective well-being reflects individuals’ life satisfaction and emotional experiences (Diener et al., 1999). However, limited research examines how energy poverty affects children’s subjective well-being, particularly in cross-country settings.

To address this gap, this study investigates the impact of energy poverty on children’s subjective well-being in four developing countries—Ethiopia, India, Peru, and Vietnam—using data from the Young Lives project. Energy poverty is measured following the multidimensional framework of Nussbaumer et al. (2012). To address potential endogeneity concerns, we employ a two-stage least squares (2SLS) approach using residential electricity prices as an instrumental variable.

Our results show that energy poverty significantly reduces children’s subjective well-being. The findings remain robust across alternative measures and specifications. We further demonstrate that health status mediates this relationship and identify heterogeneous effects across gender and age groups, with boys and older children experiencing stronger adverse impacts.

This study makes three main contributions. First, it provides cross-country causal evidence on the relationship between energy poverty and children’s subjective well-being, extending existing research beyond single-country analyses. Second, it identifies health as a key mediating mechanism linking energy deprivation to reduced well-being, thereby clarifying the underlying pathway. Third, by documenting heterogeneous effects across gender and age cohorts, the study highlights the need for child-sensitive and targeted energy policies.

The remainder of the paper proceeds as follows. Section 2 reviews the related literature and develops the research hypotheses. Section 3 describes the data sources and variable construction. Section 4 outlines the empirical strategy. Section 5 presents the main findings and robustness checks. Section 6 concludes with policy implications.

2. Literature review

Maslow's (1970) hierarchy of needs provides a useful framework for understanding how energy poverty affects children's well-being. The theory suggests that human development depends on the fulfillment of basic physiological and safety needs before higher-level psychological and social needs can be achieved. Energy poverty—defined as inadequate access to affordable, reliable, and clean energy for basic services (Reddy et al., 2000) disrupts this progression at multiple levels. Children are particularly vulnerable due to their dependence on caregivers, greater time spent indoors, and higher sensitivity to environmental risks (Jessel et al., 2019).

At the most basic level, energy poverty constrains access to adequate heating, cooling, cooking, and lighting. In developed countries, it primarily reflects affordability constraints (González-Eguino, 2015), while in developing countries it often involves limited access to electricity and clean fuels (Oum, 2019). These conditions increase exposure to indoor pollution, malnutrition, and illness, undermining children's physical development. Safety needs are also compromised, as inadequate heating, poor lighting, and unsafe fuels elevate risks of respiratory infections, accidents, and injuries (Healy, 2017; Liddell & Morris, 2010).

Beyond basic needs, energy poverty restricts opportunities for education and social participation. Poor lighting and lack of access to electricity limit study time and learning performance, while frequent illness increases school absenteeism. These constraints hinder children's cognitive and social development, reducing their sense of belonging and self-esteem.

Ultimately, prolonged exposure to energy deprivation limits children's long-term human capital accumulation and ability to reach their full potential.

Although energy poverty is increasingly recognized as a major social issue, research examining its impact on children's subjective well-being remains limited. Zhang et al. (2021a) show that in China, children in energy-poor households report lower life satisfaction, partly mediated by academic performance. Karmaker et al. (2022), using data from 18 developing countries, find that energy poverty negatively affects children's socio-emotional development and learning outcomes. However, existing studies largely rely on cross-sectional data, limiting their ability to assess sustained exposure effects.

To address this gap, our study uses longitudinal data from multiple developing countries to examine how energy poverty affects children's subjective well-being over time. This approach allows us to capture the persistent and cumulative effects of energy deprivation on child development.

Based on the above discussion, we propose:

Hypothesis 1: Energy poverty worsens children's subjective well-being.

A key limitation of the existing literature is the insufficient exploration of underlying mechanisms. One important pathway is health. Extensive evidence shows that energy poverty increases children's exposure to indoor pollution and cold environments, raising the risk of respiratory illness and delayed physical development (Mohan, 2021; Sen et al., 2023). Poor health, in turn, is strongly associated with lower life satisfaction and emotional well-being (Deaton, 2008; Clark, 2018). Chronic illness and reduced physical capacity can limit social participation and undermine self-esteem, thereby diminishing overall subjective well-being. Therefore, if energy

poverty adversely affects children's health, a reduction in subjective well-being is theoretically expected through this channel. Accordingly, we propose:

Hypothesis 2: The negative effect of energy poverty on children's subjective well-being is mediated through health.

3. Data source

3.1. Data source

This study uses data from the Young Lives (YL) project, a longitudinal survey administered by the University of Oxford and funded by the UK Department for International Development. The survey covers four developing countries: Ethiopia, India (Andhra Pradesh), Peru, and Vietnam. It provides rich information on children, households, and communities, enabling analysis of socioeconomic and developmental outcomes over time.

The YL survey employs a sentinel site sampling strategy, selecting 20 geographical sites per country with approximately 100 children per site. The sampling design deliberately oversampled poorer areas while excluding the wealthiest districts, ensuring strong representation of disadvantaged households. The overall attrition rate across survey rounds is approximately 4%, which is relatively low for longitudinal studies.

YL follows two cohorts: a younger cohort (aged 6–17 months at baseline) and an older cohort (aged 7–8 years at baseline). Data were collected in five rounds (2002, 2006, 2009, 2013, and 2016). Since subjective well-being questions were introduced in later rounds, our analysis includes the younger cohort in Rounds 3–5 and the older cohort in Rounds 2–5. This corresponds to children aged 8, 12, and 15 in the younger cohort, and 12, 15, 19, and 22 in the older cohort. The final sample consists of 35,510 observations from 8,731 children.

Although the four countries differ in economic development and institutional context, the YL project employs harmonized survey instruments and consistent sampling strategies across countries, ensuring comparability of key variables.

3.2. Variable definitions

3.2.1. Measures of energy poverty

Energy poverty is measured using the Multidimensional Energy Poverty (MEP) framework developed by Nussbaumer et al. (2012). This approach captures both the incidence and intensity of deprivation in access to modern energy services.

Following previous studies (Feeny et al., 2021; Zhang et al., 2021b), we construct five binary indicators grouped into five dimensions: cooking, essential household services, lighting, entertainment, and communication. Each dimension is assigned an equal weight (0.2). A value of one indicates deprivation in that indicator (e.g., lacking access to clean cooking fuel or a mobile phone), and zero otherwise.

A household's deprivation score is calculated as the weighted sum of these dimensions. Households are classified as energy-poor if their score exceeds 0.33, a commonly applied threshold in developing-country contexts. To test robustness, we also use an alternative threshold of 0.45.

3.2.2. Measures of subjective well-being

Children's subjective well-being is measured using a self-reported life satisfaction ladder. Respondents are asked to place themselves on a nine-step ladder, where 1 represents the worst possible life and 9 represents the best possible life. Higher values indicate greater subjective well-being.

3.2.3. Covariates

Consistent with prior literature (Dogan et al., 2022; Nguyen-Phung & Le, 2024a; Nie & Li, 2024; Phoumin & Kimura, 2019), we control for key household characteristics that may confound the relationship between energy poverty and well-being. These include urban residence, age and education of the household head, homeownership status, and household size.

3.3. Descriptive statistics

Table 1 reports the descriptive statistics of the variables used in this study. The final sample comprises 34,510 observations from 8,731 children. On average, children report a subjective well-being score of 5.51 on a nine-point scale, with a standard deviation of 1.88, indicating moderate variation in life satisfaction across respondents. Regarding energy poverty, 59.1% of children are classified as energy-poor using the 0.33 threshold (EP1), while 39.5% remain energy-poor under the stricter 0.45 cutoff (EP2). These figures suggest a substantial prevalence of energy deprivation within the sample. The average age of household heads is 44 years, and they have approximately 7.5 years of schooling, though educational attainment varies considerably. About 80% of households own their homes, and 40% reside in urban areas. The mean household size is slightly above five members, reflecting relatively large household structures typical of developing-country contexts.

Table 1. Descriptive statistics.

Variables	N	Mean	SD	Min	Max
Subjective well-being	34,510	5.511	1.882	1	9
EP1	34,510	0.591	0.492	0	1
EP2	34,510	0.395	0.489	0	1
Head of household's age	34,510	44.141	10.934	16	97

Head of household's education	34,510	7.490	6.689	0	30
Household owns a house	34,510	0.799	0.401	0	1
Urban resident	34,510	0.401	0.457	0	1
Household size	34,510	5.121	1.944	1	26

Notes: The sample consists of 8,731 children. SD: standard deviation, N: number of observations. EP1 and EP2 refer to energy poverty measured at thresholds of 0.33 and 0.45, respectively.

4. Research methodology

4.1. Fixed effect model

To investigate the effects of energy poverty on children's subjective well-being, we present the following econometric model:

$$SW_{ict} = \alpha_0 + \alpha_1 EP_{ict} + \alpha_2 \mathbf{X} + \tau_i + \tau_t + \varepsilon_{ict} \quad (1)$$

where SW_{ict} denotes subjective well-being for a child i in country c at time t . Variable EP_{ict} is binary, demonstrating whether an individual is subject to energy poverty. A value of one indicates the presence of energy poverty, whereas a value of zero signifies its absence. \mathbf{X} represents a set of control variables. Specifically, we include controls for urban resident status, the age of the head of the household, the education level of the head of the household, homeownership, and household size. τ_i and τ_t denotes individual fixed effect and time fixed effect, respectively. α_0 , α_1 , and α_2 are unknown parameters and ε_{ict} is an error term.

4.2. Fixed-effect instrumental variable model

The aforementioned fixed-effects regression may be susceptible to endogeneity concerns arising from reverse causality, implying that individuals' subjective well-being can impact their likelihood of experiencing energy poverty. For example, a decline in subjective well-being caused by shortages of natural resources and energy might prompt individuals to relocate to areas with

adequate energy access and more advanced infrastructure, such as urban regions (González-Eguino, 2015; Piderit, 1998).

To resolve these issues, we utilize the 2SLS regression. The use of energy price as an instrumental variable (IV) for energy poverty is well-supported in the existing literature (Churchill & Smith, 2021; Li et al., 2022b; Zhang et al., 2021a). Similarly, we utilize the price of residential electricity at the country level as an IV for our main explanatory variables.¹ The first stage isolates exogenous component of energy poverty that is uncorrelated with the error term by regressing energy poverty (EP_i) on country-level electricity price, alongside other control variables (\mathbf{X}):

$$EP_{ict} = \gamma_0 + \gamma_1 Price_{ct} + \gamma_2 \mathbf{X} + \tau_i + \tau_t + u_{ict} \quad (2a)$$

where $Price_{ct}$ denotes the electricity price of country c in year t . γ_0 , γ_1 , and γ_2 are parameters and u_{ict} is an error term. The fitted value of energy poverty \widehat{EP}_{ict} derived from this regression is subsequently utilized as the primary variable in the following second stage:

$$SW_{ict} = \theta_0 + \theta_1 \widehat{EP}_{ict} + \theta_2 \mathbf{X} + \tau_i + \tau_t + \vartheta_{ict} \quad (2b)$$

We assume that $Price_{ct}$ is uncorrelated with an individual's subjective well-being. As a result, θ_1 can be interpreted as the causal impact of energy poverty on the children's subjective well-being.

The validity of the IV approach hinges on two key assumptions. The first is the exclusion restriction, requiring that the IV influences the outcomes solely through its effect on the explanatory variable. In this study, we posit that electricity prices should have influenced children's subjective well-being solely because of their effects on energy poverty. This assumption is considered plausible as the country-level electricity price primarily reflects the country's economic situation, which is unlikely to be directly affected by an individual's subjective well-

¹ We utilize the information for country-level prices of residential electricity obtained from Enerdata.

being. Although it is inherently difficult to directly test this assumption, we evaluate its credibility through an array of robustness checks, which will be discussed in detail later in this study.

The second assumption is relevance, which requires that the instrument must exhibit a strong correlation with energy poverty. Table 4 evaluates the relevance of the instrument, revealing results that surpass the standard thresholds for identifying weak instruments (Staiger & Stock, 1994).

Because the model includes individual fixed effects, all time-invariant characteristics—including country-specific structural differences—are absorbed. As each child remains within the same country throughout the panel, national characteristics such as long-run development level, institutional structures, and energy infrastructure are effectively controlled for. Moreover, identification in the instrumental-variable framework relies on within-country over-time variation in residential electricity prices. Therefore, the estimated effects are not driven by cross-country mean differences, but by exogenous price variation within each national context.

5. Empirical findings

5.1. Baseline fixed effect regression

Table 2 presents the baseline fixed-effects estimates examining the relationship between energy poverty and children's subjective well-being. Across both specifications, energy poverty is negatively and statistically significantly associated with children's life satisfaction at the 1% level. Using the 0.33 threshold (EP1), children living in energy-poor households experience a 0.142-point reduction in subjective well-being. When applying the stricter 0.45 threshold (EP2), the magnitude increases to 0.185 points. The larger coefficient under EP2 suggests that more severe energy deprivation exerts a stronger adverse effect on children's well-being.

Table 2. Energy poverty and subjective well-being: fixed effect estimates.

	Different threshold to measure energy poverty	
	EP1	EP2
Subjective well-being	-0.142*** (0.032)	-0.185*** (0.035)
R^2	0.003	0.003
<i>Number of observations</i>	34,510	34,510
<i>Number of children</i>	11,356	11,356

Notes: EP1 and EP2 refer to energy poverty measured at thresholds of 0.33 and 0.45, respectively. Robust standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

5.2. Instrumental variable analysis

Table 3 reports the instrumental variable (IV) estimates of the causal impact of energy poverty on children’s subjective well-being. Using fitted values from the first-stage regression, the results show a large and statistically significant negative effect across both energy poverty measures.

Under the 0.33 threshold (EP1), energy poverty reduces children’s subjective well-being by 2.91 points on the nine-point life satisfaction scale. Using the stricter 0.45 threshold (EP2), the estimated decline is 2.36 points. All coefficients are statistically significant at the 1% level. The magnitudes are substantially larger than those obtained from the fixed-effects estimates, suggesting that baseline estimates may suffer from attenuation bias due to measurement error or reverse causality.

The first-stage results indicate that residential electricity prices are positively and strongly associated with energy poverty status. The Kleibergen-Paap rk Wald F statistics (898.1 and 1200.2) are well above conventional thresholds, providing strong evidence against weak instrument concerns. This supports the relevance condition of the instrumental variable.

Table 3. Energy poverty and children’s subjective well-being.

	Different threshold to measure energy poverty	
	EP1	EP2
Subjective well-being	-2.906*** (0.216)	-2.359*** (0.167)
<i>Number of observations</i>	34,510	34,510
<i>Number of children</i>	11,356	11,356
<i>Weak id.</i>	898.098	1200.194
First-stage results		
Price of electricity residential (USD2015 incl. taxes)	0.048*** (0.002)	0.059*** (0.002)

Notes: EP1 and EP2 refer to energy poverty measured at thresholds of 0.33 and 0.45, respectively. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Weak id. refers to Kleibergen-Paap rk Walk F statistics.

Table 4 presents robustness checks using an alternative measure of residential electricity prices (USD2015 per toe). The IV estimates remain nearly identical in magnitude and significance, and the weak identification statistics continue to indicate strong instrument relevance. This consistency reinforces the credibility of the causal interpretation.

Table 4. Different measures of instrumental variable.

	Different threshold to measure energy poverty	
	EP1	EP2
Subjective well-being	-2.906*** (0.217)	-2.356*** (0.167)
<i>Number of observations</i>	34,510	34,510
<i>Number of children</i>	11,356	11,356
<i>Weak id.</i>	894.256	1198.595
First-stage results		
Price of electricity residential (USD2015/toe incl. taxes)	0.0004*** (0.000)	0.001*** (0.000)

Notes: EP1 and EP2 refer to energy poverty measured at thresholds of 0.33 and 0.45, respectively. Robust standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Weak id. refers to Kleibergen-Paap rk Walk F statistics.

5.3. Pathways

Table 5 presents the 2SLS estimates examining the relationship between energy poverty and children's health outcomes. The analysis focuses on two health measures: reported health status and relative health compared to peers.

The results show that energy poverty is negatively and statistically significantly associated with both health indicators. Under EP1, the estimated coefficient for reported health is -0.605 (standard error = 0.090), indicating a statistically significant reduction at the 1% level. For relative health, the estimated coefficient is -0.148 (standard error = 0.040), also significant at the 1% level. The sample includes 31,673 observations for reported health and 20,797 observations for relative health, corresponding to 10,953 and 7,249 children, respectively. All specifications include control variables. The Kleibergen-Paap rk Wald F statistics are 743.015 and 1860.62, respectively, exceeding conventional thresholds. The first-stage estimates indicate that the price of residential electricity is positively and statistically significantly associated with energy poverty, with coefficients of 0.066 and 0.068 (both significant at the 1% level).

Taken together, the 2SLS estimates show a statistically significant negative association between energy poverty and both measures of children's health. The results provide empirical support for the proposed health-related mechanism. Specifically, energy poverty significantly worsens children's health outcomes. Combined with the well-established positive association between health and subjective well-being documented in the literature, these findings are consistent with the hypothesized pathway.

Table 5. Pathways.

	Reported health	Relative health
EP1	-0.605*** (0.090)	-0.148*** (0.040)
<i>Number of observations</i>	31,673	20,797
<i>Number of children</i>	10,953	7,249
<i>Weak id.</i>	743.015	1860.62
Control variables	Yes	Yes
First-stage results		
Price of electricity residential (USD2015 incl. taxes)	0.066*** (0.002)	0.068*** (0.002)

Notes: EP1 refers to energy poverty measured at thresholds of 0.33. Robust standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Weak id. refers to Kleibergen-Paap rk Walk F statistics.

5.4. Heterogenous analysis

Figure 1 presents the heterogeneous effects of energy poverty on children’s subjective well-being by gender and cohort. The coefficient plots display IV point estimates along with 95% confidence intervals under both energy poverty thresholds (EP1 and EP2).

Across gender groups, energy poverty is negatively and statistically significantly associated with subjective well-being in all specifications. Under EP1, the estimated coefficient is -3.098 for boys and -2.730 for girls. Under EP2, the corresponding estimates are -2.361 for boys and -2.346 for girls. All coefficients are statistically significant at the 1% level, and the confidence intervals do not overlap with zero. The larger coefficients among boys may reflect gender-differentiated expectations or time-use patterns that shape the psychological consequences of energy deprivation (Welsch & Biermann, 2017). While these explanations are not directly tested in the present study, they provide plausible interpretations and suggest directions for future research.

When examining cohort differences, the negative effects remain statistically significant for both younger and older children. Under EP1, the estimated impact is -1.033 for the young cohort and -3.788 for the old cohort. Under EP2, the coefficients are -1.060 and -2.743 , respectively. The magnitude of the estimated coefficients differs across cohorts, with larger absolute values observed for the older cohort under both thresholds. The stronger effects observed among older children may reflect greater cognitive awareness of material deprivation and higher dependence on electricity for academic activities. Adolescents face increasing educational demands and may therefore be more sensitive to disruptions in lighting, heating, or study environments (Zhang et al., 2021a). Moreover, prior research suggests that subjective well-being during adolescence is particularly responsive to environmental and socioeconomic conditions (Diener et al., 1999; Clark, 2018).

Overall, the results indicate that the negative association between energy poverty and subjective well-being persists across gender and cohort subgroups under both energy poverty measures. The statistical significance of the coefficients is consistent across all specifications.

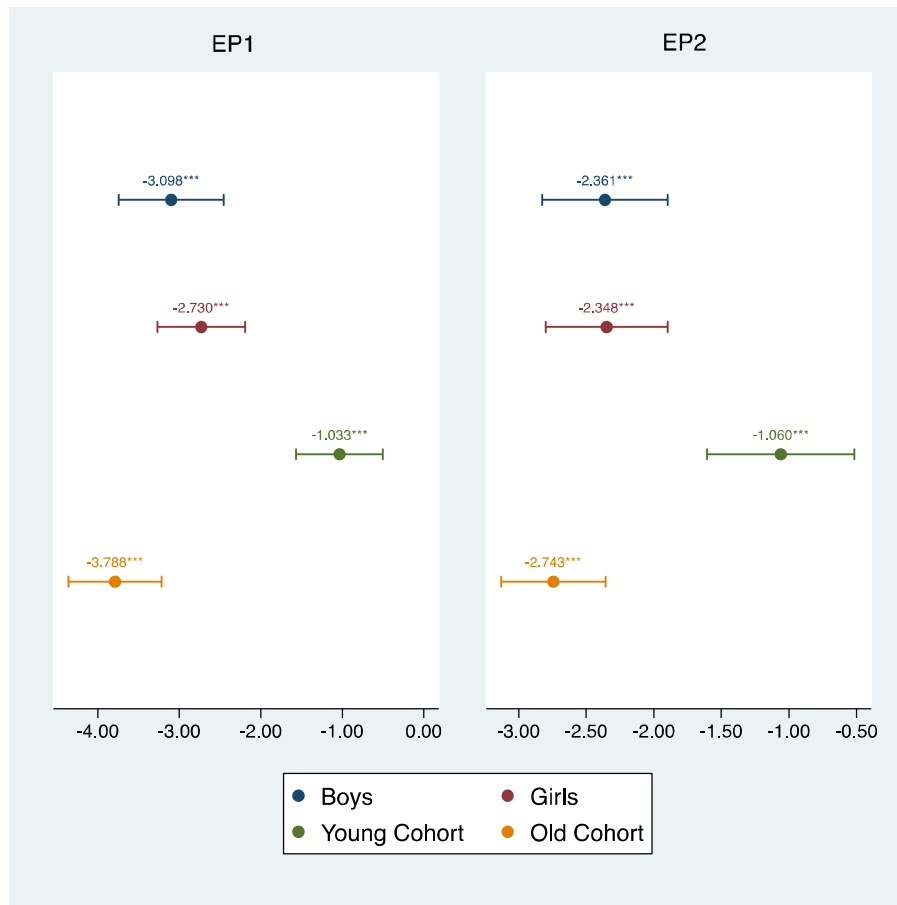


Figure 1. Coefficient plots for energy poverty against children's subjective well-being

6. Conclusions

This study examines the impact of energy poverty on children's subjective well-being in four developing countries: Ethiopia, India, Peru, and Vietnam. Using longitudinal data from the Young Lives project and a multidimensional measure of energy poverty, we provide causal evidence based on a 2SLS framework that exploits variation in residential electricity prices as an instrumental variable.

The empirical results consistently indicate that energy poverty significantly reduces children's subjective well-being. The findings remain robust across alternative energy poverty

thresholds and instrumental variable specifications. The analysis further identifies health as an important transmission channel through which energy deprivation affects children's life satisfaction. In addition, the heterogeneity analysis shows that the adverse effects persist across gender and age groups, with larger magnitudes observed among boys and older children.

These findings underscore that energy poverty extends beyond material deprivation and has meaningful implications for child development and well-being. In developing-country contexts, limited access to reliable and affordable energy services may constrain living conditions and undermine children's physical and psychological outcomes.

From a policy perspective, reducing energy poverty should be considered a child-sensitive development priority. Expanding access to reliable and affordable electricity, particularly for low-income and rural households, may yield substantial welfare gains for children. Targeted support mechanisms—such as energy subsidies for vulnerable households, improved grid infrastructure, and investments in decentralized renewable energy systems—can enhance both affordability and access. Strengthening energy infrastructure in underserved communities may therefore contribute not only to progress toward universal energy access but also to improvements in children's overall well-being.

Overall, addressing energy poverty represents an important step toward promoting equitable child development and advancing broader development objectives in low- and middle-income countries.

Reference

- Chen, H., Gao, K., Tian, S., Sun, R., Cui, K., & Zhang, Y. (2023). Nexus between energy poverty and sustainable energy technologies: A roadmap towards environmental sustainability. *Sustainable Energy Technologies and Assessments*, 56, 102949. <https://doi.org/10.1016/j.seta.2022.102949>
- Churchill, S. A., & Smyth, R. (2021). Energy poverty and health: Panel data evidence from Australia. *Energy economics*, 97, 105219. <https://doi.org/10.1016/j.eneco.2021.105219>
- Clark, A. E. (2018). Four decades of the economics of happiness: Where next?. *Review of Income and Wealth*, 64(2), 245-269. <https://doi.org/10.1111/roiw.12369>
- Deaton, A. (2008). Income, health, and well-being around the world: Evidence from the Gallup World Poll. *Journal of Economic Perspectives*, 22(2), 53-72. <https://doi.org/10.1257/jep.22.2.53>
- Diener, E., Suh, E. M., Lucas, R. E., & Smith, H. L. (1999). Subjective well-being: Three decades of progress. *Psychological bulletin*, 125(2), 276. <https://doi.org/10.1037/0033-2909.125.2.276>
- Dogan, E., Madaleno, M., & Taskin, D. (2022). Financial inclusion and poverty: evidence from Turkish household survey data. *Applied Economics*, 54(19), 2135-2147. <https://doi.org/10.1080/00036846.2021.1985076>
- Feeny, S., Trinh, T. A., & Zhu, A. (2021). Temperature shocks and energy poverty: Findings from Vietnam. *Energy Economics*, 99, 105310. <https://doi.org/10.1016/j.eneco.2021.105310>
- González-Eguino, M. (2015). Energy poverty: An overview. *Renewable and Sustainable Energy Reviews*, 47, 377-385. <https://doi.org/10.1016/j.rser.2015.03.013>
- Healy, J. D. (2017). *Housing, fuel poverty and health: a pan-European analysis*. Routledge.

- IEA (International Energy Agency). (2022). World Energy Outlook 2022. Paris, France: IEA.
<https://iea.blob.core.windows.net/assets/830fe099-5530-48f2-a7c1-11f35d510983/WorldEnergyOutlook2022.pdf>
- IEA, IRENA, UNSD, World Bank, WHO. (2023). Tracking SDG 7: The Energy Progress Report. World Bank, Washington DC. © World Bank.
<https://iea.blob.core.windows.net/assets/9b89065a-ccb4-404c-a53e-084982768baf/SDG7-Report2023-FullReport.pdf>
- Jessel, S., Sawyer, S., & Hernández, D. (2019). Energy, poverty, and health in climate change: a comprehensive review of an emerging literature. *Frontiers in Public Health*, 7, 357.
<https://doi.org/10.3389/fpubh.2019.00357>
- Karmaker, S. C., Sen, K. K., Singha, B., Hosan, S., Chapman, A. J., & Saha, B. B. (2022). The mediating effect of energy poverty on child development: Empirical evidence from energy poor countries. *Energy*, 243, 123093. <https://doi.org/10.1016/j.energy.2021.123093>
- Liddell, C., & Morris, C. (2010). Fuel poverty and human health: a review of recent evidence. *Energy policy*, 38(6), 2987-2997. <https://doi.org/10.1016/j.enpol.2010.01.037>
- Li, X., Yang, H., & Jia, J. (2022a). Impact of energy poverty on cognitive and mental health among middle-aged and older adults in China. *Humanities and Social Sciences Communications*, 9(1), 1-13. <https://doi.org/10.1057/s41599-022-01276-4>
- Li, Y., Ning, X., Wang, Z., Cheng, J., Li, F., & Hao, Y. (2022b). Would energy poverty affect the wellbeing of senior citizens? Evidence from China. *Ecological Economics*, 200, 107515.
<https://doi.org/10.1016/j.ecolecon.2022.107515>
- Maslow, A. (1970). Motivation and Personality. 2nd. (ed.) Harper and Row. *New York*.

- Mohan, G. (2021). Young, poor, and sick: The public health threat of energy poverty for children in Ireland. *Energy Research & Social Science*, 71, 101822. <https://doi.org/10.1016/j.erss.2020.101822>
- Nguyen-Phung, H. T., & Le, H. (2024a). Elderly well-being amidst energy poverty: Exploring the health, social, and economic impacts in Vietnam. *Energy Research & Social Science*, 118, 103762. <https://doi.org/10.1016/j.erss.2024.103762>
- Nie, P., & Li, Q. (2024). Does energy poverty increase health care expenditures in China?. *Applied Economics*, 56(35), 4209-4235. <https://doi.org/10.1080/00036846.2023.2210823>
- Nie, P., Li, Q., & Sousa-Poza, A. (2021). Energy poverty and subjective well-being in China: New evidence from the China Family Panel Studies. *Energy Economics*, 103, 105548. <https://doi.org/10.1016/j.eneco.2021.105548>
- Nussbaumer, P., Bazilian, M., & Modi, V. (2012). Measuring energy poverty: Focusing on what matters. *Renewable and Sustainable Energy Reviews*, 16(1), 231-243. <https://doi.org/10.1016/j.rser.2011.07.150>
- OECD, 2024. How's life? 2024 Well-being and Resilience in Times of Crisis. https://www.oecd.org/en/publications/how-s-life-2024_90ba854a-en.html
- Oum, S. (2019). Energy poverty in the Lao PDR and its impacts on education and health. *Energy Policy*, 132, 247-253. <https://doi.org/10.1016/j.enpol.2019.05.030>
- Phoumin, H., & Kimura, F. (2019). Cambodia's energy poverty and its effects on social wellbeing: Empirical evidence and policy implications. *Energy Policy*, 132, 283-289. <https://doi.org/10.1016/j.enpol.2019.05.032>

- Piderit, J. J. (1998). LABOR-Labor mobility and social wellbeing under international capitalism. *International Journal of Social Economics*, 25(11/12), 1684-1698.
<https://doi.org/10.1108/03068299810233349>
- Reddy, A. K., Annecke, W., Blok, K., Bloom, D., Boardman, B., Eberhard, A., & Ramakrishna, J. (2000). Energy and social issues. *World Energy Assessment*, 39-60.
<https://stuff.mit.edu/afs/athena.mit.edu/course/other/d-lab/Readings/energy2.pdf>
- Sen, K. K., Karmaker, S. C., Hosan, S., Chapman, A. J., & Saha, B. B. (2023). Thinking of the children: Energy poverty and acute respiratory infections among young children in South Asia. *Energy Research & Social Science*, 105, 103271.
<https://doi.org/10.1016/j.erss.2023.103271>
- Welsch, H., & Biermann, P. (2017). Energy affordability and subjective well-being: Evidence for European countries. *The Energy Journal*, 38(3), 159-176.
<https://doi.org/10.5547/01956574.38.3.hwel>
- WHO, 2024. <https://www.who.int/news-room/fact-sheets/detail/household-air-pollution-and-health>
- Zhang, Q., Appau, S., & Kodom, P. L. (2021a). Energy poverty, children's wellbeing and the mediating role of academic performance: Evidence from China. *Energy Economics*, 97, 105206. <https://doi.org/10.1016/j.eneco.2021.105206>
- Zhang, Z., Shu, H., Yi, H., & Wang, X. (2021b). Household multidimensional energy poverty and its impacts on physical and mental health. *Energy Policy*, 156, 112381.
<https://doi.org/10.1016/j.enpol.2021.112381>

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